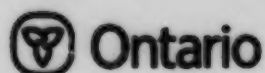


**Ontario Geological Survey
Open File Report 6084**

**Report of Activities, 2001
Resident Geologist Program**

**Southern Ontario Regional Resident
Geologist Report:
Southeastern and Southwestern
Districts, Mines and Minerals
Information Centre and Petroleum
Resources Centre**

2002

**ONTARIO GEOLOGICAL SURVEY****Open File Report 6084****Report of Activities, 2001
Resident Geologist Program****Southern Ontario Regional Resident Geologist Report:
Southeastern and Southwestern Districts,
Mines and Minerals Information Centre and
Petroleum Resources Centre****by****P.J. Sangster, W.J. McGuinty, V.C. Papertzian, K.G. Steele, C.R. Lee, D.A. Laidlaw,
M. Barua, T.R. Carter and B.D. Parkes****2002**

Parts of this publication may be quoted if credit is given. It is recommended that reference to this publication be made in the following form:

Sangster, P.J., McGuinty, W.J., Papertzian, V.C., Steele, K.G., Lee, C.R., Laidlaw, D.A., Barua, M., Carter, T.R. and Parkes, B.D. 2002. Report of Activities 2001, Resident Geologist Program, Southern Ontario Regional Resident Geologist Southeastern and Southwestern Districts, Mines and Minerals Information Centre, and Petroleum Resources Centre; Ontario Geological Survey, Open File Report 6084, 102p.

Open File Reports of the Ontario Geological Survey are available for viewing at the Mines Library in Sudbury, at the Mines and Minerals Information Centre in Toronto, and at the regional Mines and Minerals office whose district includes the area covered by the report (see below).

Copies can be purchased at Publication Sales and the office whose district includes the area covered by the report. Although a particular report may not be in stock at locations other than the Publication Sales office in Sudbury, they can generally be obtained within 3 working days. All telephone, fax, mail and e-mail orders should be directed to the Publication Sales office in Sudbury. Use of VISA or MasterCard ensures the fastest possible service. Cheques or money orders should be made payable to the *Minister of Finance*.

Mines and Minerals Information Centre (MMIC)
Macdonald Block, Room M2-17
900 Bay St.
Toronto, Ontario M7A 1C3

Tel: (416) 314-3800

Mines Library
933 Ramsey Lake Road, Level A3
Sudbury, Ontario P3E 6B5

Tel: (705) 670-5615

Publication Sales
933 Ramsey Lake Rd., Level A3
Sudbury, Ontario P3E 6B5

Tel: (705) 670-5691(local)

1-888-415-9845(toll-free)

Fax: (705) 670-5770

E-mail: pubsales@ndm.gov.on.ca

Regional Mines and Minerals Offices:

Kenora - Suite 104, 810 Robertson St., Kenora P9N 4J2

Kirkland Lake - 10 Government Rd. E., Kirkland Lake P2N 1A8

Red Lake - Box 324, Ontario Government Building, Red Lake P0V 2M0

Sault Ste. Marie - 70 Foster Dr., Ste. 200, Sault Ste. Marie P6A 6V8

Southern Ontario - P.O. Bag Service 43, Old Troy Rd., Tweed K0K 3J0

Sudbury - Level B3, 933 Ramsey Lake Rd., Sudbury P3E 6B5

Thunder Bay - Suite B002, 435 James St. S., Thunder Bay P7E 6S7

Timmins - Ontario Government Complex, P.O. Bag 3060, Hwy. 101 East, South Porcupine P0N 1H0

Toronto - MMIC, Macdonald Block, Room M2-17, 900 Bay St., Toronto M7A 1C3

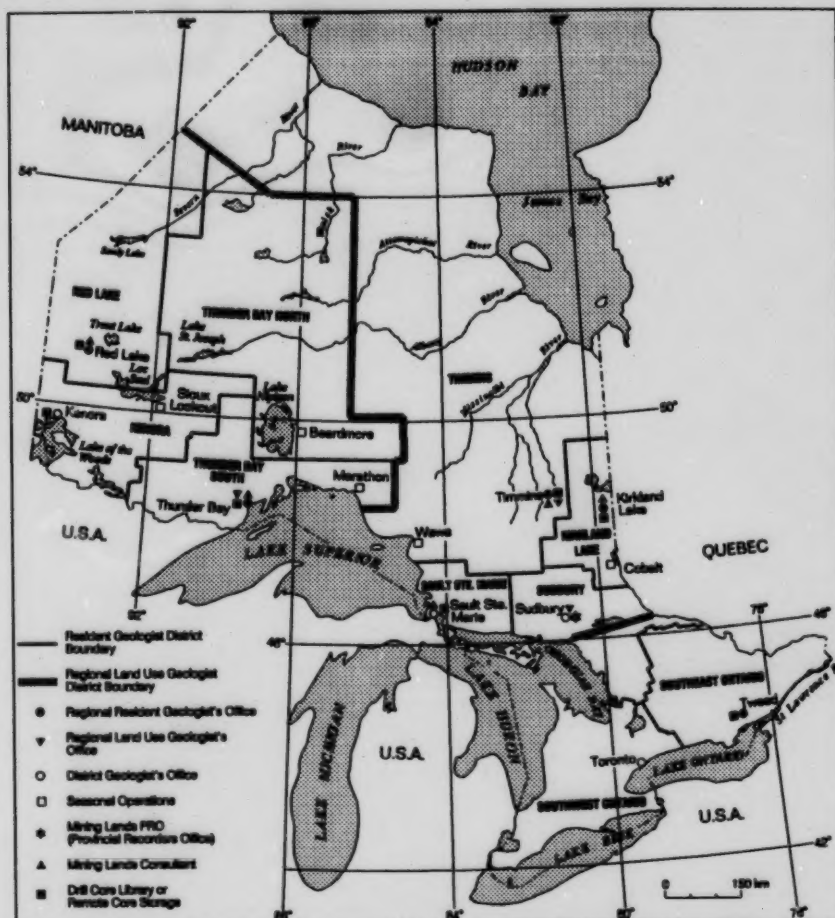
This report has not received a technical edit. Discrepancies may occur for which the Ontario Ministry of Northern Development and Mines does not assume any liability. Source references are included in the report and users are urged to verify critical information. Recommendations and statements of opinions expressed are those of the author or authors and are not to be construed as statements of government policy.

If you wish to reproduce any of the text, tables or illustrations in this report, please write for permission to the Team Leader, Publication Services, Ministry of Northern Development and Mines, 933 Ramsey Lake Road, Level B4, Sudbury, Ontario P3E 6B5.

Cette publication est disponible en anglais seulement.

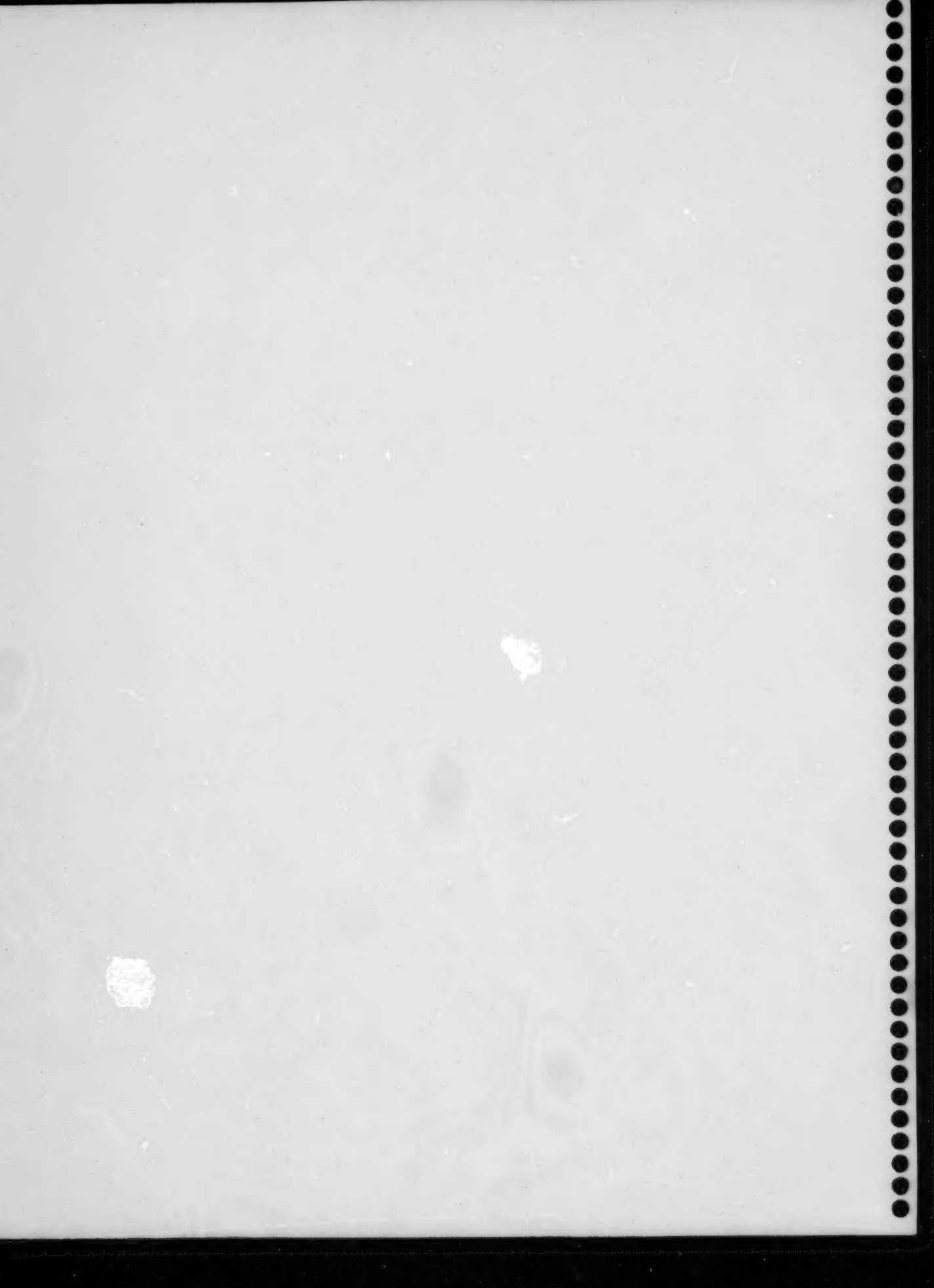
Parts of this report may be quoted if credit is given. It is recommended that reference be made in the following form:

Sangster, P.J., McGuinty, W.J., Papertzan, V.C., Steele, K.G., Lee, C.R., Laidlaw, D.A., Barua, M., Carter, T.R. and Parkes, B.D. 2002. Report of Activities 2001, Resident Geologist Program, Southern Ontario Regional Resident Geologist Report: Southeastern and Southwestern Districts, Mines and Minerals Information Centre, and Petroleum Resources Centre; Ontario Geological Survey, Open File Report 6084, 102p.



Mines and Minerals Division Regional & District Offices

CITY	ADDRESS	OFFICE(S)	TELEPHONE	FAX
Kanora	Suite 104, 810 Robertson St. P2N 4J2	○ ■	(807) 488-2613	(807) 488-2930
Red Lake	Box 324, Ontario Government Building 227 Howey Street P0V 2M0	● ■ ▲	(807) 727-3272 (807) 727-3284	(807) 727-3553 (807) 727-3553
Thunder Bay-North	Suite B002, 435 James St. S., Thunder Bay P7E 6S7	● ■ ▼ ▲	(807) 475-1331 (807) 475-1311	(807) 475-1112 (807) 475-1124
Thunder Bay-South	Suite B002, 435 James St. S., Thunder Bay P7E 6S7	● ■ ▼ ▲	(807) 475-1331 (807) 475-1311	(807) 475-1112 (807) 475-1112
Sault Ste. Marie	Suite 200, 70 Foster Dr. P6A 6V8	○ ■	(705) 945-8931	(705) 945-8936
Timmins	Ontario Government Bldg., P.O. Bag 3060, Hwy 101 East, South Porcupine P0N 1H0	● ■ ▼ ▲	(705) 235-1615 (705) 235-1600	(705) 235-1620 (705) 235-1620
Kirkland Lake	10 Government Rd. E. P2N 1A2	● ■ ▲	(705) 588-4518 (705) 587-9242	(705) 588-4515 (705) 587-5821
Sudbury	Level B3, 933 Ramsey Lake Rd. P3E 6B5	○ * ▼	(705) 670-5735 (705) 670-5737	(705) 670-5881 (705) 670-5807
Tweed	P.O. Bag Service 43, 126 Old Troy Rd., K0K 3J0	● ■	(613) 478-3181	(613) 478-2873
Toronto	Mines and Minerals Information Centre, Room M2-17, MacDonald Block, 900 Bay St. M7A 1C3	○	(416) 314-3800	(416) 314-3797



ONTARIO GEOLOGICAL SURVEY
RESIDENT GEOLOGIST PROGRAM
REPORT OF ACTIVITIES - 2001

SOUTHERN ONTARIO
REGIONAL RESIDENT GEOLOGIST REPORT

CONTENTS

1. Southeast Ontario District
2. Southwest Ontario District
3. Mines and Minerals Information Centre
4. Petroleum Resources Centre



**Ontario Geological Survey
Regional Resident Geologist Program**

**Southern Ontario Regional Resident Geologist
(Southeast Ontario District)—2001**

by

P.J. Sangster, V.C. Papertzian and D.A. Laidlaw

2002

CONTENTS

Southern Ontario Regional Resident Geologist (Southeast Ontario District)–2001

INTRODUCTION	1
MINING ACTIVITY	1
Traprock	1
3M Canada Inc.....	1
I.K.O Industries Ltd.....	2
ADVANCED EXPLORATION.....	6
Palu-Corbelli Corporation Granite Deposit – Sheffield Township	6
Regis Resources Vermiculite Deposit – Cavendish Township	6
J.C. Archibald Property – Galway Township	6
Floyd Preston Limited – Harvey Township	6
EXPLORATION ACTIVITY	7
Blue Marble Mining Corporation – Galway Township	7
Lydia Diamond Exploration of Canada Ltd.....	7
Candor Ventures	7
Canadian Wollastonite – St. Lawrence Wollastonite Deposit – Pittsburgh Township	7
LAND USE PLANNING ACTIVITY	14
Ontario's Living Legacy – 2001	14
Ministry of Municipal Affairs and Housing.....	14
RESIDENT GEOLOGIST STAFF AND ACTIVITIES.....	15
Southern Ontario Prospector's Association (S.O.P.A.)	19
PROPERTY EXAMINATIONS.....	21
Madoc Township Slate Deposits	21
Senator Stone Ltd., Highway 7 Marble Quarry – Elzevir Township	21
St. Lawrence Cement, Ogden Point Quarry – Cramahe Township	21
RECOMMENDATIONS FOR EXPLORATION.....	22
Mineral Fillers and Extenders.....	22
Dimension Stone.....	22
Granite Flagstone, Central Gneiss Belt / Limestone Flagstone, Gull River Formation.....	22
Graphite	23
OGS ACTIVITIES AND RESEARCH BY OTHERS.....	29
Operation Treasure Hunt – Industrial Mineral Project	29
Potential for Platinum Group Elements Mineralization in Mafic-Ultramafic Intrusions in Ontario	29
Petrography and Mineralogy of an Ultrabasic Dyke of Kimberlitic Affinity at Varty Lake, Ontario	30
Structural Field Mapping, Structural Petrography and Geochemistry of the Addington Granite	30
REFERENCES.....	30

Tables

1. Mining activity in 2001	2
2. Exploration activity in 2001	8
3. Summary of staking activity from 1993 to 2001 and value of assessment work completed 1993 to 1996.....	11
4. Assessment files received in 2001	11
5. Municipal plans reviewed in 2001	14
6. Field visits completed in 2001	16
7. Resident Geologist Program statistics for 2001	19
8. Library acquisitions, 2001.....	19
9. Mineral deposits not currently being mined, 2001	23

10. Titanium, tantalum and REE occurrences compiled from MDI-2 database	25
11. Historic production of gold	27
12. Historic production of copper, lead and zinc	27
13. Historic production of iron.....	27
14. Historic production of fluorite	28
15. Publications of the Ontario Geological Survey, 2001	29

Figures

1. Mining activity in 2001	5
2. Exploration activity in 2001	10
3. Property visits and claim staking activity in 2001	18

Southern Ontario Regional Resident Geologist (Southeast Ontario District)—2001

P.J. Sangster¹, V.C. Papertzian² and D.A. Laidlaw³

¹Southern Ontario Regional Resident Geologist, Ontario Geological Survey

²Southeastern Ontario District Geologist, Ontario Geological Survey

³Southeastern Ontario District Support Geologist, Ontario Geological Survey

INTRODUCTION

In 2001 the District saw continued production from mines and quarries both in the Grenville Province and in the Palaeozoic rocks to the south and to the east. Junior mining companies, independent prospectors and one major mining company completed exploration programs. Claim staking activity increased by approximately 225% from the previous year. The majority of new claims staked were primarily related to a diamond exploration program in Hastings County and a graphite exploration program in Frontenac County. Diamonds, graphite, vermiculite, wollastonite, tantalum/niobium, gold and platinum group elements were among commodities sought. The evaluation of potential dimension stone deposits continued to maintain a high profile in the area.

MINING ACTIVITY

During 2001 there were 39 mining operations in southeastern Ontario including: 6 industrial mineral operations; 2 traprock producers; 2 cement producer's quarries; 1 brick producer's quarry; 3 gemstone and mineral specimen sites and 25 dimension and decorative stone quarries. Table 1 and Figure 1 provide a complete listing of mining activity and the locations of operating mines and mills in southeastern Ontario.

Traprock

Two companies in southeastern Ontario currently quarry traprock to produce roofing granules. Although not limited to any single rock type, to be suitable for the production of roofing granules a deposit must meet rigid physical and chemical specifications. The material must be durable and resistant to weathering, adaptable to the colouring process, uniform, of sufficient tonnage, of low porosity, opaque to ultraviolet light, and exhibit equidimensional fracture on crushing. Additional factors that contribute to the economic viability of a deposit include proximity to market, access to transportation and lack of deleterious minerals.

3M Canada Inc.

3M Canada Inc. owns and operates a traprock quarry and plant in Belmont Twp. east of Havelock immediately north of Highway 7. The company quarries a uniform dense, dark green metavolcanic rock that breaks into roughly equidimensional fragments. The stone is essentially free of sulphide minerals. The quarry was originally opened in 1907 to produce aggregate for road surfacing but has been producing raw material for roofing granules since 1948. Crushing and colouring plants are located onsite.

The company produces roofing granules and HL-1 aggregate used in the production of premium asphalt mixes for Ontario highways, concrete, anti-skid treatment, bridge decks, railway ballast, asphalt shingles and rolled roofing from an onsite quarry. The operation currently employs 85 people. Production in 2001 was 317 005 t shipped, in comparison to 309 834 t shipped in 2000.

The company has announced that the operation is scheduled for closure in May 2002. Although the deposit contains a reserve of 50 million tons, 3M operates 5 other plants in the U.S.A. and has decided to consolidate and confine operations to within that country. Demolition of the onsite colouring plant will begin in June 2002. The remaining plant and quarry are for sale (OGS MP 161, 3M Canada Inc., Feb. 2002).

I.K.O Industries Ltd.

Since 1991, I.K.O. Industries Ltd. has operated a traprock quarry east of Madoc, on the south side of Hwy 7. The quarry is located within a ridge of grey to black, fine-grained, agglomeratic, metavolcanic rock. The rock is durable and exhibits no undesirable weathering effects. An onsite mill and colouring plant produce roofing granules that are trucked to the company's asphalt shingle manufacturing plant in Brampton.

In addition to roofing granules, stone from the quarry is crushed to produce HL-1 aggregate (asphalt road surfacing mix). The quarry is licensed under the Aggregate Resources Act to produce up to 1 Mt per year. A total of 70 people are currently employed at the quarry, mill and colouring plant (OGS MP 161, I.K.O. Industries Ltd., Feb. 2002).

Table 1. Mining activity in 2001 - Southern Ontario Regional Resident Geologist (Southeast), keyed to Figure 1.

No.	Company/Individual (Mine Name)	Township (Commodity)	Mining Activity
1.	3M Canada Inc. (Havelock Quarry)	Belmont (Trap Rock)	Roofing granules and HL-1 aggregate used in the production of premium asphalt mixes for Ontario highways, concrete, anti-skid treatment, bridge decks, railway ballast, asphalt shingles and rolled roofing.
2.	Allan Franks Construction Ltd.	Madoc (Limestone)	Limestone has been quarried and crushed since 1991 for road aggregate.
3.	Aqua Rose Quarries	Lyndoch (Gem Minerals)	Quarrying operations for rose quartz, beryl, feldspar, lyndochite, amazonite, cleavelandite, peristerite, columbite, fluorite and bertrandite. Two quarries are in operation: the Beryl Pit which charges a fee for mineral collecting; and the Rose Quartz Quarry which produces landscape stone.
4.	Arricraft Corporation (Elgin Quarry)	Bastard (Sandstone)	Potsdam sandstone was quarried for the manufacture of reconstituted sandstone. Raw material was shipped to Cambridge, ON, for processing. In 1998, a new application was found with blocks being quarried and cut into tiles for lining acid tanks.
5.	Bancroft Chamber of Commerce (Bear Lake Diggings)	Monmouth (Mineral Specimens)	Fee for collecting site near Wilberforce.
6.	Belmont Rose Granite Corp. (Belmont Rose Granite Quarry)	Belmont (Dimension Stone)	Granite is quarried for dimension stone, curb stone and landscaping purposes.
7.	Canada Brick (Russell Quarry)	Russell, Gloucester (Clay Products)	Clay bricks are produced from red shale. During 2000, 74 883 tonnes of material were extracted. The quarry is located in Russell Twp. while the brick plant, located in Gloucester Twp., produced an estimated 42 M brick units.
8.	Canada Talc Division, Highwood Resources Ltd., (Henderson Mine)	Huntingdon (Talc, Dolomite)	Highwood Resources Ltd. purchased Canada Talc in 1999. Highwood has upgraded and expanded facilities at both the mine and the processing plant. Additional access to ore has been attained by the development of a new mining level (underground) at the Madoc Mine which will allow for the planned increase in production to over 20 000 t per year. Similarly, the completed upgrading and expansion of processing lines at the Marmora processing plant has allowed for the increased volume of ground and micronized talc and dolomite products as well as the processing of other mineral filler products, principally barite.

No.	Company/Individual (Mine Name)	Township (Commodity)	Mining Activity
9.	Central Ontario Natural Stone (Batty Quarry)	Laxton (Limestone)	Grey, buff and black limestone is produced as flagstone.
10.	Central Ontario Natural Stone (Oxtongue Lake Quarry)	McClintock (Stone)	Pink and grey granite gneisses are quarried for flagstone, building stone, landscaping stone from 12 separate quarries, including a newly licensed operation at Bobcaygeon.
11.	Cornwall Gravel Company Ltd. (Cornwall Quarry)	Cornwall (Limestone)	Rough blocks of black limestone for dimension stone are produced on demand from the thick upper beds of this construction aggregate quarry.
12.	Danford Construction (Springbrook Road Quarry)	Huntingdon (Limestone)	Limestone is quarried and crushed for road aggregate (seasonal operation).
13.	Drain Construction	Dummer (Limestone)	Limestone for use as road aggregate.
14.	Drain Construction	Methuen (Granite)	Crushed stone for aggregate.
15.	Elite Blue Marble	Chandos (Marble)	Stone is split / guillotined for flagging and landscape stone.
16.	Esroc Canada Inc. (Picton Quarry)	Sophasburg (Cement)	A cement plant and on-site limestone quarry with an annual production of slightly less than 1 million tons. This is one of the largest cement plants in North America.
17.	Granimar Quarries Ltd.	Rear of Leeds and Lansdowne (Granite)	Approximately 10 000 cubic feet of granite was shipped from the stockpile at the quarry site. An additional 50 000 cubic feet of granite has been extracted from the quarry and is ready for shipping.
18.	I.K.O. Industries Ltd. (I.K.O. Quarry)	Madoc (Trap Rock)	Trap rock is quarried for roofing granules and HL-1 aggregate. An on-site mill and colouring plant have been in operation since 1998.
19.	International Quartz Ltd.	McClintock (Quartz)	Decorative and crushed white quartz and terrazzo.
20.	LaFarge Canada Inc. (Bath Quarry)	Ernestown (Cement)	A cement plant and on-site limestone quarry with a capacity to produce 1 million tonnes of cement. Silica used in the production of cement is extracted from the company's Potsdam sandstone quarry in Pittsburgh Twp. as well as from recycled foundry sands.
21.	Nelson Windover Quarries (Windover, Buckhorn Quarry)	Harvey (Limestone)	Grey limestone is quarried as a seasonal operation for the production of flagstone.
22.	North Hastings Aggregate Ltd.	Dungannon (Decorative Aggregate)	Multicoloured granite is extracted for use as decorative aggregate. 15 000 tons were shipped in 1999.*
23.	OMYA (Canada) Inc. (Tatlock Quarry)	Darling (Calcite)	Calcitic marble is mined to produce high purity, fine-grind calcite for fillers with terrazzo chips and landscaping stone as secondary products. Annual production is 250 000 tons and quarry reserves currently stand at over 5 M tons. In 2000, a 5-year expansion program was completed at their quarry and plant located in Perth.
24.	Payne, E.W. (Payne Quarry)	Dummer (Limestone)	Flagstone is produced seasonally from this quarry. In 1999*, 1500 t were quarried.
25.	Princess Sodalite Mine	Dungannon (Gemstones)	Rehabilitation of the site continues under new ownership. Limited samples were available for sale on site.
26.	Redstone Quarries	Harvey (Limestone)	Red and green marble as well as grey limestone is quarried for flagstone, landscaping stone and armour stone.

SOUTHEAST ONTARIO DISTRICT - 2001

No.	Company/Individual (Mine Name)	Township (Commodity)	Mining Activity
27.	Rideauview Contractors Ltd. (Ellisville Quarry)	Rear Leeds & Lansdowne (Sandstone)	Sandstone, produced for landscaping material and limestone from Pettworth is also processed on site.
28.	Rideauview Contractors Ltd. (Pettworth & Renaud Quarries)	Camden (Limestone)	Limestone was quarried for building restoration work in Kingston.
29.	Rideauview Contractors Ltd. (Rideauview Quarry)	Storrington (Sandstone)	Red sandstone is produced for ashlar and flagstone.
30.	Rideauview Contractors Ltd. (Sloan Quarry, Battersea Quarry)	Storrington (Sandstone, Granite)	Cream and red sandstone is quarried for the production of ashlar, flagstone and landscaping stone at the Sloan Quarry. Red granite is quarried at the Battersea Quarry.
31.	Senator Stone	Elzevir (Marble)	The quarry began production in 2001. Calcitic marble is quarried seasonally and crushed onsite. See property visit in this report.
32.	St. Lawrence Cement Inc. (Ogden Point Quarry)	Cramahe (Limestone, Cement)	The quarry has been in production since 1939. It produces between 1.9 - 2.1 Mt of limestone per year. Crushed stone from the quarry is shipped by lake to the company's cement plant in Mississauga. The quarry employs 20 people.
33.	Stone Cottage Inn Ltd. (Attia Quarries)	Harvey (Limestone)	Grey limestone is quarried for dimension stone.
34.	The Kingston Red Granite Co. Ltd. (Seeley's Bay Quarry #1 & Seeley's Bay Quarry #2)	Rear of Leeds and Lansdowne (Granite)	Red granite is quarried for armour stone, landscaping, architectural and structural stone from both quarries. 18 000 t were processed in 2000.*
35.	Timminco Ltd. (Timminco Metals Quarry)	Ross (Magnesium, Strontium & Calcium metal)	Magnesium is produced from high-purity dolomite mined at this location. Calcium and strontium are produced from purchased limestone. Production rate is 1000 tons of dolomite weekly. The annual production is 6000 tons of magnesium metal and alloys; 400 tons of calcium metal and alloys; and 135 tons of strontium metal. The operation employs 240 people and there are reserves for 50 years at the current rates of production.
36.	TRT Aggregates Ltd.	Ameliasburgh, Hilliard, Tyendinaga, Thurlow & Richmond (Limestone)	Rough dimension stone blocks, armour stone, flagstone and crushed limestone are produced. Most of the quarries are operated on an as-needed basis. Lafarge Canada acquired TRT at the end of 2000.
37.	Unimin Canada Ltd. (Blue Mountain Quarry)	Methuen (Nepheline Syenite)	Nepheline syenite is mined from a quarry and processed in 2 mills. Magnetite is produced as a by-product. Production rate is 2500 tons per day. The mine opened in 1955 and employs 152 people.
38.	Upper Canada Stone Co. Ltd. (Mephisto Lake Quarry)	Cashel (Calcitic Marble)	White marble is quarried and sold as crushed marble, landscaping stone, decorative stone and in pre-cast architectural concrete and panels.
39.	Upper Canada Stone Co. Ltd.	Madoc (Marble)	Red, pink, white, green, buff, black, blue, chocolate, light buff and light green marble is mined from 8 quarries in the Madoc area. Marble chips (terrazzo), exposed aggregate and landscape stone are produced at the mill. In 2001, Upper Canada Stone acquired operations of Specialty Aggregate - Madoc plant and quarries.

*2001 figures not available at time of writing

SOUTHEASTERN ONTARIO RESIDENT GEOLOGIST'S DISTRICT

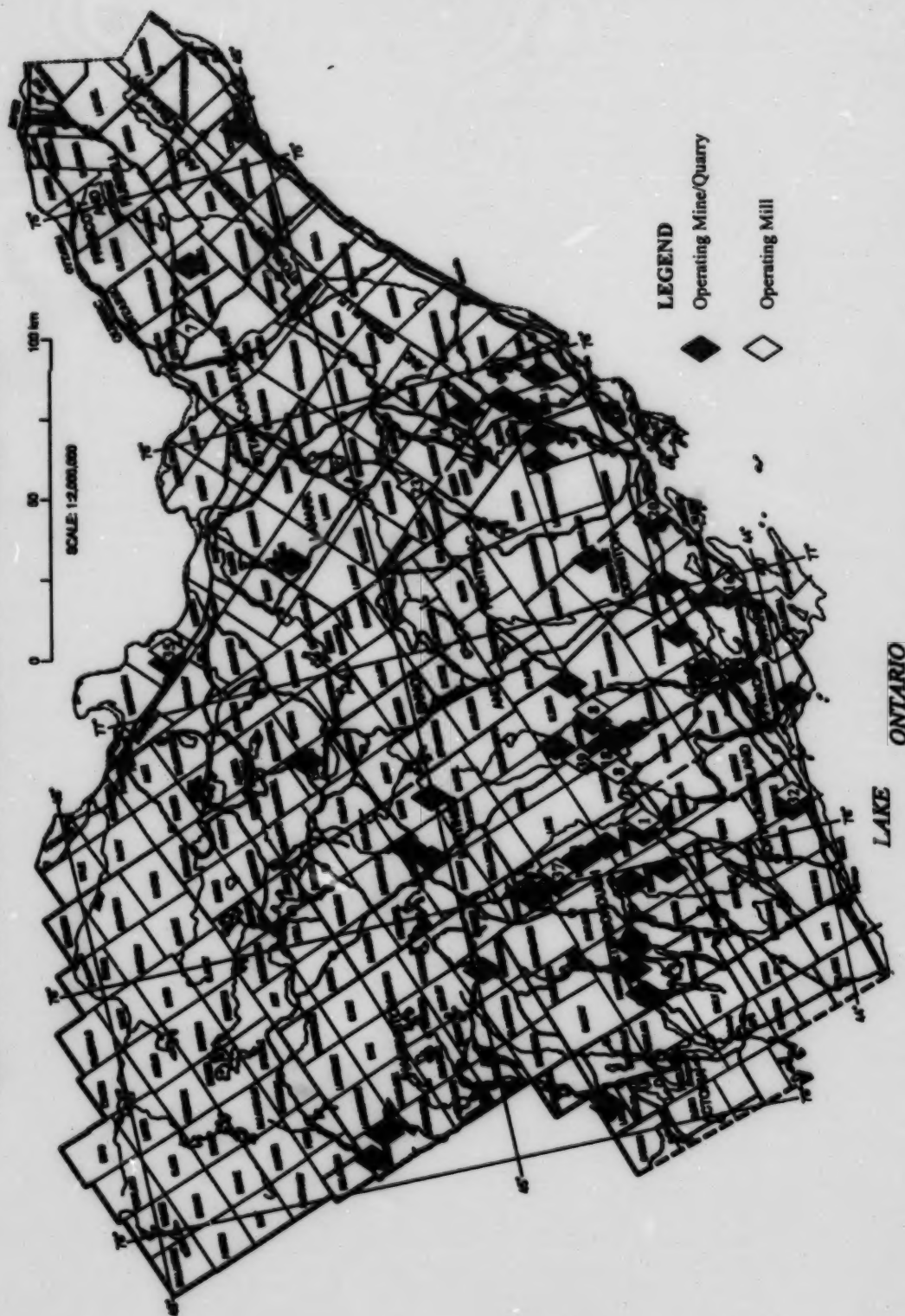


Figure 1: Mining/Quarrying Activity in 2001 - Southeast District, Southern Ontario Regional Resident Geologist Region

ADVANCED EXPLORATION

Palu-Corbelli Corporation Granite Deposit – Sheffield Township

Results of a bulk-sampling program completed on the Palu-Corbelli Corporation granite dimension stone prospect in Sheffield Township in 2000 were very positive. The company's original application for permitting under the Aggregate Resources Act to bring the quarry into production was rejected by the Ministry of Natural Resources (MNR). In 2001, the company completed a second application for permitting and also completed additional environmental and natural heritage studies as requested by MNR. Results of the new studies confirmed that the proposed activity does not constitute a threat to heritage values or to the environment. The company is currently awaiting a decision by MNR on its second application for permitting. The property is situated on unpatented mining claims surrounded by an *Ontario's Living Legacy* proposed conservation reserve (J. Palu, Palu-Corbelli Corporation, personal communication, 2001, 2002).

Regis Resources Vermiculite Deposit – Cavendish Township

A summary of previous work on the Regis Resources Cavendish Township vermiculite deposit is given in 1998, 1999 and 2000 Report of Activities, Southern Regional Resident Geologist (Southeast). In 2001, the company was granted permitting under the Aggregate Resources Act to operate below the water table. Construction has been completed of an onsite facility where an unexfoliated vermiculite concentrate will be produced. Response from customer testing of a 40-ton bulk sample has been positive. No asbestos has been detected in the vermiculite and the company plans to be in production by May-June 2002 (M. Shefski, Regis Resources Ltd., personal communication, February 8, 2001).

J.C. Archibald Property – Galway Township

J.C. Archibald Property consists of 151 unpatented mining claims in Galway and Cavendish townships totaling 4049 ha. The company has negotiated rights to an additional 311 ha of patented land. In 2001, 11 trenches were excavated to evaluate 2 known vermiculite zones on the property. Subsequently, 3 diamond drill holes were completed to test the true depth of the vermiculite below 2 of the trenches. In 2001 the company was issued a bulk sample permit by MNDM and several large samples were taken from the mineralized zones for detailed study, all of which showed no fibrous asbestos minerals. Metallurgical testing by the Ontario Research Foundation found no gangue or hazardous minerals associated with the vermiculite. Further tests by Lakefield Research found no asbestos. Two mineralized zones have been traced over 17 000 m and 18 000 m with widths averaging 215 m and 195 m respectively (MNDM assessment file # 2.22229).

Floyd Preston Limited – Harvey Township

In 2001, Floyd Preston Limited was granted a permit to take a 900 t bulk sample to test granite from unpatented mining claims in Harvey Township. The property consists of 12 claim units and is located approximately 50 km north of Peterborough. The granite is described as medium grained, pink to red and consisting of equal parts quartz and feldspar with an estimated 3% biotite. In July and August, extraction was completed at the site and approximately 700 t of broken rock was crushed and sized. The various size fractions will be tested for suitability for selected types of road aggregate. Oversize pieces will be promoted for landscape application. Test cutting with a guillotine of 10 t of flat, oversize pieces was successful. An additional 10 t of large, (1 t to 4 t) blocks from the site have been sent to Sudbury for test cutting and polishing as dimension stone (Floyd Preston Limited, MNDM Assessment File # 2.21984, 2001).

EXPLORATION ACTIVITY

Blue Marble Mining Corporation – Galway Township

In 2001, Blue Marble Mining Corporation completed a preliminary evaluation of vermiculite mineralization on the company's 35 claim units in Galway Township. The exploration program consisted of prospecting, mapping, till and bedrock sampling, trenching and analyses. One zone was successfully traced over a distance of 4000 m. Samples were routinely dried, sieved weighed and exfoliated. Several large samples were collected for more detailed analysis. Metallurgical testing by the Ontario Research Foundation found no gangue or hazardous minerals associated with the vermiculite. Further tests by Lakefield Research found no asbestos and only minor amounts of non-fibrous types of tremolite (MNDM assessment file # 2.21330, 2001).

Lydia Diamond Exploration of Canada Ltd.

Lydia Diamond Exploration of Canada Ltd. has expanded their unpatented mining claim holdings to include approximately 60 000 acres in Tudor, Grimsthorpe, Cashel and Effingham townships. During the 2000-2001 field seasons 250 till samples were collected in order to define an indicator mineral train that would lead to the source of diamonds found in till on their property. The company's press release dated January 9, 2002, indicated that they have been successful in determining a cut-off line for the indicator mineral train.

In addition to the till sampling, Lydia Diamonds Exploration conducted a diamond drilling program that resulted in the intersection of a number of lamprophyre dikes. The company further reports that caustic fusion analysis of samples taken from these dikes produced 1 macro-diamond and 3 micro-diamonds. In 2002 the company will continue to test anomalies generated by their previous work. The company is currently continuing both a diamond drill program and additional till sampling on the property (Lydia Diamond Exploration of Canada Ltd., personal communications / press releases 2001, 2002).

Candor Ventures

In 2001, Candor Ventures finalized the acquisition of an Ontario company that held 18 unpatented mining claims in Madoc Township. The company believes the area has high potential for oxide copper gold mineralization. In 2001, two holes totaling 562 m were diamond drilled to test the down dip extension of the past producing Eldorado Copper Mine. The holes were lined with plastic pipe to allow for the completion of future down-hole geophysical surveys. Plans for 2002 include linecutting, magnetometer and induced polarization surveys (P. Chamois, personal communication 12/02/02, Candor Ventures, press release 1/29/02).

Canadian Wollastonite – St. Lawrence Wollastonite Deposit – Pittsburgh Township

Canadian Wollastonite plans to develop the St. Lawrence Wollastonite deposit in Pittsburgh Township. U.S. Borax completed advanced exploration and evaluation under an agreement with the property holder that commenced in February 1992. The property was returned to the owner in August 2000, together with titles and documentation of exploration and development work. Canadian Wollastonite has completed market research, transportation studies and the acquisition of additional property in 2001. A road has been constructed to access the deposit from the owners' farm east of Hwy 15.

The total mineable mineral resource is calculated to be 9.6 Mt with an average grade of 38.1% wollastonite. Of this total, 5.1 Mt has been delineated with a high degree of confidence (delineated, indicated and drill inferred reserves), with an average block reserve grade of 41.3% wollastonite. The remaining 4.5 Mt was calculated through geologic inference based predominantly on surface outcrop. A grade of 34.5% wollastonite assigned to the inferred reserves is based on the overall average grade of both wollastonite and adjacent calc-silicate zones.

The deposit has an additional 3.7 Mt of calc-silicate ore independent of the wollastonite skarn reserves. A potential co-product is diopside (Canadian Wollastonite, personal communication, 2001).

Table 2. Exploration activity in 2001 - Southern Ontario Regional Resident Geologist (Southeast).

AEM	Airborne electromagnetic survey	Lc	Linecutting
AM	Airborne magnetic survey	Met.....	Metallurgical testing
ARA	Airborne radiometric survey	OD	Overburden drilling
Beep	Beep Mat survey	ODH.....	Overburden drill hole(s)
Bulk.....	Bulk sampling	OMIP	Ontario Mineral Incentive Program
DD	Diamond drilling	OPAP	Ontario Prospectors Assistance Program
DDH	Diamond drill hole(s)	PEM	Pulse electromagnetic survey
DGP	Down-hole geophysics	PGM.....	Platinum group metals
GC	Geochemical survey	Pr	Prospecting
GEM	Ground electromagnetic survey	RES	Resistivity survey
GL	Geological Survey	Samp	Sampling (other than bulk)
GM	Ground magnetic survey	Seismic	Seismic survey
GRA	Ground radiometric survey	SP	Self-potential survey
Grav	Gravity survey	Str	Stripping
HLEM	Horizontal loop electromagnetic survey	Tr	Trenching
HM	Heavy mineral sampling	UG	Underground exploration/development
IM	Industrial mineral testing and marketing	VLEM	Vertical loop electromagnetic survey
IP	Induced polarization survey	VLFEM	Very low frequency electromagnetic survey

No	Company/Individual (Occurrence Name) or Property	Township/Area (Commodity)	Exploration Activity
1.	Archibald, J.C.	Galway (Vermiculite)	Str, Tr, DD, IM
2.	Bancroft & District Chamber of Commerce	Monmouth (Min. Spec.)	Phys.
3.	Blue Marble Mining Corp.	Cavendish (Vermiculite), Galway (Vermiculite)	Geol, Samp, Tr, Str
4.	Byers, J.	Elzevir (Marble)	Samp, IM
5.	Canadian Wollastonite	Pittsburgh (Wollastonite)	Geol, Samp, Str, Road
6.	Candor Ventures Corp.	Madoc (Cu, Au)	Pr, Samp
7.	Dacre Industrial	Griffith (Marble)	Str, Geol
8.	Dillman R.	Grimsthorpe (Au, BM, Diamonds)	HM
9.	Floyd Preston Limited	Harvey (Granite)	Bulk, Geol
10.	Glanfield, M.	Barrie (Au)	Pr
11.	Graphite Mountain Inc.	Bedford (Graphite), North Burgess (Graphite)	DD, Tr, Drill
12.	Grenville Gold Corporation	Grimsthorpe (Au)	DD
13.	Jeff Parnell Contracting Ltd.	Galway (Limestone)	Str, Geol
14.	Johnson, M.	Galway (Limestone)	Samp
15.	Jones, F.	McClintock (Quartz)	DD

16.	Linear Resources	Lyndoch (REE)	Samp, Geol
17.	Londry, J. et al	Lyndoch (REE)	Pr, Samp
18.	Lydia Diamond Exploration	Tudor (Diamonds)	DD, HM
19.	Milford Minerals	Ashby (Marble)	Bulk
20.	Palu, J. (Palu-Corbelli)	Elzevir, Sheffield, Kaladar (Dim St.)	Bulk, IM
21.	Pelangio Mines Inc.	Lyndoch, Denbigh (BM)	DD, Geol, Samp
22.	Preston, L.	Cavendish (Granite)	Site Prep.
23.	Quinto Mining	Bastard (Graphite)	Geol
24.	Randsburg International Gold Corp.	McClintock (BM, PGM)	Pr, DD
25.	Regis Resources	Cavendish (Vermiculite)	Samp, IM
26.	Royel Paving	Galway (Stone)	Str, Geol, Testing
27.	Saxongate Ltd.	Grimsthorpe (Diamonds), Tudor (Diamonds)	GC, HM, AEM, AM
28.	Trigan Resources Inc.	Methuen (Stone)	Pr, Bulk, Samp, IM
29.	Upper Canada Stone	Madoc (Marble)	Samp
30.	Vinecrest Management Services	Butt (Graphite)	GEM
31.	Wilson, M.	Camden East (Soapstone)	Str, Testing

SOUTHEASTERN ONTARIO RESIDENT GEOLOGIST'S DISTRICT

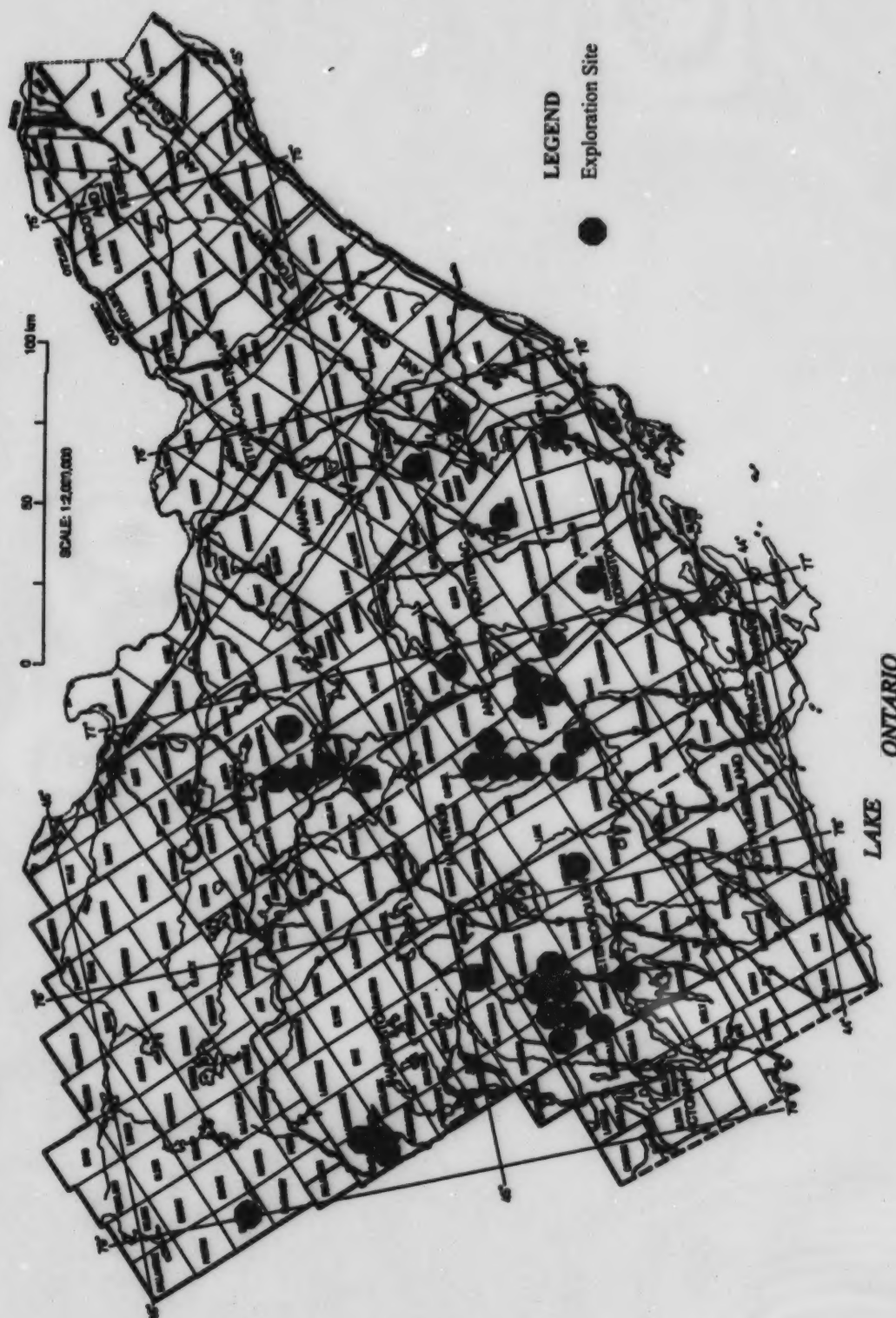


Figure 2: Exploration Activity in 2001 - Southeast District, Southern Ontario Regional Resident Geologist Region

Table 3. Summary of staking activity from 1993 to 2001 and value of assessment work completed from 1993 to 1996 – Southern Ontario Regional Resident Geologist (Southeast).

Year	Claims Units Recorded	Claim Units Cancelled	Claims Units Active	Diamond Drilling (\$)	Physical Work (\$)	Geotechnical Work* (\$)	Total (\$)
2001	1 729	373	3 580				
2000	762	NA	NA				
1999	545	NA	1 538				
1998	269	NA	1 588				
1997	201	249	NA	NA	NA	NA	NA
1996	748	251	1 304	19 767	99 434	212 178	331 379
1995	301	346	807	44 185	31 554	86 368	162 107
1994	229	417	852	763 545	115 052	135 168	1 013 765
1993	153	277	1 040	NA	8 399	125 853	134 252

* As of 1992, Geological and Geophysical Survey data are combined as Geotechnical Work

Table 4. Assessment files received in 2001 – Southern Ontario Regional Resident Geologist (Southeast).

Abbreviations	
AEM	Airborne electromagnetic survey
AM	Airborne magnetic survey
ARA	Airborne radiometric survey
Beep	Beep Mat survey
Bulk	Bulk sampling
DD	Diamond drilling
DDH	Diamond drill hole(s)
DGP	Down-hole geophysics
GC	Geochemical survey
GEM	Ground electromagnetic survey
GL	Geological Survey
GM	Ground magnetic survey
GRA	Ground radiometric survey
Grav	Gravity survey
HLEM	Horizontal loop electromagnetic survey
HM	Heavy mineral sampling
IM	Industrial mineral testing and marketing
IP	Induced polarization survey
Lc	Linecutting
Met	Metallurgical testing
OD	Overburden drilling
ODH	Overburden drill hole(s)
OMIP	Ontario Mineral Incentive Program
OPAP	Ontario Prospectors Assistance Program
PEM	Pulse electromagnetic survey
PGM	Platinum group metals
Pr	Prospecting
RES	Resistivity survey
Samp	Sampling (other than bulk)
Seismic	Seismic survey
SP	Self-potential survey
Str	Stripping
Tr	Trenching
UG	Underground exploration/development
VLEM	Vertical loop electromagnetic survey
VLFEM	Very low frequency electromagnetic survey

SOUTHEAST ONTARIO DISTRICT - 2001

	Township or Area	Company Name	Year	Type of Work	AFRO Number	Resident Geologist Office File Designation
1.	Anglesea (Au)	Beesley, T.J.	1999	Grid, Geol, Pr, Samp, Str	2.21028	39
2.	Anglesea (Au, BM)	Beesley, T.	1999	Grid, Geol, Pr, Samp, Str, GC	OP99-386	40
3.	Anglesea (PGM, Au, BM)	Laidlaw, J.	1999	Pr, Samp	OP99-545	41
4.	Ashby (Garnet)	Stewart, R.V.	2000	Geol	2.20746	14
5.	Ashby (Graphite)	Stewart, R.V.	1999	Grid, Geol, GEM, Samp	OP99-176	15
6.	Barrie (Au, Ag)	Ore Chimney (Rinaldi, R.)	1965	Report	Donated	111
7.	Barrie (Au, Ag)	Banner, A.	1999	Tr, Samp, Geol	OP99-391	112
8.	Bedford (Graphite)	Graphite Mountain Inc.	99-00	DD	2.21074	40
9.	Bedford (Graphite)	Graphite Mountain Inc.	1998	Tr, Drill	2.19436	41
10.	Brougham (Graphite)	Stewart, R.V.	1999	Geol, GEM	OP99-176	17
11.	Butt (Graphite)	Vinecrest Management Services	2001	GEM	2.21990	2
12.	Cardiff (Min. Spec.)	Fouts, C.	1999	Geol	OP99-117	228
13.	Cavendish (REE, Beryl, Garnet)	Ross, D.J.	98-00	Geol, Pr, Samp	2.20570	117
14.	Cavendish (Vermiculite)	Blue Marble Mining Corp.	2000	Samp, Geol	2.20075	118
15.	Cavendish (Vermiculite)	Archibald, F.T.	1999	Geol, Samp, Pr	OP99-179	119
16.	Cavendish (Vermiculite)	Blue Marble Mining Corp.	2001	Samp, Geol	2.21462	120
17.	Clarendon (Marble, Au, Ni)	Gallo, E.A.	1999	Pr, Samp	OP99-197	47
18.	Darling (Au)	Adams, J.	1999	Geol, Pr, Lc, Samp, DD, GEM, GM	OP99-88	81
19.	Denbigh (Cu, Zn)	Pelangio Mines Inc.	2000	DD, Samp	2.20984	6
20.	Denbigh (Graphite)	Stewart, R.V.	1999	Grid, Geol, GEM, Samp	OP99-176	5
21.	Galway (Vermiculite)	Archibald, A.; Archibald, J.C.	1999	Geol, Pr, Samp	OP99-342, 343	39
22.	Galway (Limestone)	Jeff Parnell Contracting Ltd.	2001	Str, Geol	2.21877	42
23.	Galway (Vermiculite)	Archibald, J.C.	99-00	Geol, Samp	2.20795	38
24.	Galway (Vermiculite)	Archibald, J.C.	1999	Pr, Geol, Samp	2.20826	40
25.	Galway (Vermiculite)	Blue Marble Mining Corp.	2000-01	Tr, Str, Samp, Geol	2.21330	41
26.	Galway (Vermiculite)	Archibald, J.C.	2001	Str, Tr, DD, IM	2.22229	43
27.	Griffith (Dol. Marble)	Dacre Industrial Minerals Inc.	2000	Geol, IM	2.20672	21

Township or Area	Company Name	Year	Type of Work	AFRO Number	Resident Geologist Office File Designation
28. Griffith (Marble, Au, Ni)	Gallo, E.A.	1999	Pr, Samp	OP99-197	22
29. Grimsthorpe (Au, BM, Diamonds)	Dillman, R.	2000-01	HM	2.20926	71
30. Grimsthorpe (Diamonds)	Saxongate Ltd.	2001	GC, HM	2.21987	74
31. Grimsthorpe (Au)	Grenville Gold Corporation	2001	DD	2.21073	73
32. Grimsthorpe (PGM, Au, BM)	Laidlaw, J.	1999	Pr, Samp, Grid, GM, GEM	OP99-545	72
33. Grimsthorpe (PGM, BM)	Laidlaw, C.J.; Beesley, T.J.	99-00	Grid, GM, GEM, Geol, Pr, Samp	2.20852	70
34. Harvey (Granite)	Floyd Preston Limited	2001	Bulk, Geol	2.21984	13
35. Kaladar (Dimension Stone)	Pahu-Corbelli Corporation	2000	IM	2.20820	71
36. Laxton (Limestone)	Wessell, I.H.	97-99	Drill	2.21452	6
37. Lyndoch (Cu, Zn)	Pelangio Mines Inc.	2000	DD, Samp	2.20984	42
38. Lyndoch (Graphite)	Stewart, R.V.	1999	Str, Tr, Geol, Samp	OP99-176	41
39. Madoc (Cu)	Phelps Dodge Corp. of Canada	2000	Geol, GC, Samp	2.21878	145
40. Madoc (Cu)	Phelps Dodge Corp. of Canada	2000	Geol, GC, Samp	2.21880	146
41. Madoc (Cu, Au)	Candor Ventures Corp.	2001	Pr, Samp	2.22329	147
42. Madoc (Fe)	Thompson, L.G.D.	1999	Geol, Samp GM, Grav	OP99-254	142
43. Madoc (Au)	Brown, W.J.	2000	Str, Pr	2.20812	144
44. Madoc (Marble, Au, Ni)	Gallo, E.A.	1999	Pr, Samp	OP99-197	141
45. Madoc (Metapelite)	Reed, A.	2000	Samp	2.21499	143
46. Marmora (Au)	Ross, R.J.	1999	Grid, Geol, GC, GM, GEM	OP99-266	88
47. Marmora (Marble, Au, Ni)	Gallo, E.A.	1999	Pr, Samp	OP99-197	87
48. McClintock (BM, PGM)	Randsburg International Gold Corp.	2001	Pr	2.21950	54
49. McClintock (Quartz)	Jones, F.E.	2000	DD	2.20849	53
50. Methuen (Ca, Marble, Si)	Kretachmar, U.	1999	Grid, Pr, Geol, Samp, IM	OP99-398	40
51. Monmouth (Min. Spec.)	Fouts, C.	1999	Tr, Geol, GRA	OP99-117	152
52. Monmouth (Min. Spec.)	Bancroft & District Chamber of Commerce	2001	Phys.	2.22249	153
53. North Burgess (Graphite)	Graphite Mountain Inc.	2000	DD	2.20865	20
54. North Burgess (Graphite)	Graphite Mountain Inc.	99-00	DD	2.22054	21
55. Oso (Marble, Au, Ni)	Gallo, E.A.	1999	Pr, Samp	OP99-197	1

Township or Area	Company Name	Year	Type of Work	AFRO Number	Resident Geologist Office File Designation
56. South Canonto (U)	Thunderwood Explorations Ltd	1976	Gra, DD, Samp	Donated	15
57. Tudor (BM, Au)	Tulonen, P.V.G.; King, B.R.	1999	DD, Samp	OP99-358, 359	96
58. Tudor (Diamonds)	Saxongate Ltd.	2001	AEM, AM	2.21977	100
59. Tudor (Diamonds)	Saxongate Ltd.	2001	GC, HM	2.21987	101
60. Tudor (Diamonds)	Lydia Consol. Diamond Mines of Canada Ltd.	2000	DD	2.21476	99
61. Tudor (Dim. Stone)	1045839 Ontario Limited	2000	Lc, Geol	2.21414	98
62. Tudor (Au)	Hodgson, R.	1999	Geol, GC, GM	OP99-184	94
63. Tudor (Au)	Dillman, R.; Chard, J.	1999	DD, Samp	OP99-543, 203	95
64. Tudor (Au)	Hodgson, R.	1999	GM, GC	2.20888	97

LAND USE PLANNING ACTIVITY

Ontario's Living Legacy – 2001

In 2001, a project to evaluate the Provincially Significant Mineral Potential (PSMP) of all proposed protected sites designated under *Ontario's Living Legacy* was initiated. For further details on PSMP and *Ontario's Living Legacy* see Debicki et al. 2002. Dave Rowell is the RLUG responsible for southern Ontario south of the French River and Manitoulin Island.

Ministry of Municipal Affairs and Housing

Through the Ministry's commitment to mineral-related Provincial Policy Statements contained within the Planning Act, the Resident Geologist Program (RGP) staff provide comment and input into the development of municipal Official Plans and Official Plan Amendments. The process is conducted through the Ministry of Municipal Affairs and Housing's (MMAH) one-window approach. A summary of Official Plan (OP) related activities conducted by the Southern Regional Resident Geologist (Southeast) is presented in Table 5.

Table 5. Municipal plans reviewed in 2001 – Southern Ontario Regional Resident Geologist (Southeast).

County	Municipality	Plan Type
Frontenac	South Frontenac	OP
Frontenac	Twp. of Frontenac Islands	OP, Zoning By-law
Frontenac	Central Frontenac	Draft OP
Haliburton	Lutterworth	OP
Haliburton	Haliburton	OP
Haliburton	Haliburton	Draft OP Application
Hastings	Hastings County	OP
Hastings	City of Quinte West	OP

County	Municipality	Plan Type
Hastings	City of Quinte West	Adopted OP w Revisions
Hastings	City of Belleville	OP Application
Hastings	City of Quinte West	OP
Lanark	Drummond/North Elmsley	Draft OP Application
Lanark	Lanark Highlands	Draft OP Application
Lennox & Addington	Town of Greater Napanee	OP Application
Nipissing	South Algonquin Tp.	5 consents
Northumberland	Brighton	OP Amendment
Northumberland	Town of Cobourg	OP
Northumberland	Hope	OP Amendment
Northumberland	Campbellford-Seymour, Percy, Hastings	Draft OP
Ottawa-Carleton	City of Nepean	OP Application
Renfrew	McNab/Braeside	OP Amendment No.3 Application
Renfrew	City of Pembroke	OP Application
Renfrew	City of Pembroke	Draft OP Application
Stormont, Dundas & Glengarry	North Glengarry	OP
Victoria	Kawartha Lakes	OP pre-consultation

The Southern Ontario Regional Resident Geologist and the Southeast District Geologist attended a number of inter-ministerial meetings hosted by MMAH to review current Official Plans and related planning issues. An inter-ministry education committee has been formed to provide training for new MMAH planners, partner ministries and municipal planners. The first in a series of workshops was held for MMAH planners in December. Presentations covered a number of resource issues including mining, aggregate extraction, fisheries and agriculture.

RESIDENT GEOLOGIST STAFF AND ACTIVITIES

During 2001, staff of the Southern Ontario Regional Resident Geologist (Southeast) office included: P.J. Sangster, Southern Ontario Regional Resident Geologist; V.C. Papertzian, Southeast District Geologist; and D.A. Laidlaw, Southeast District Support Geologist. C. Morrison and Mike Neuman provided field season support under the Summer Experience Program.

There are more than 6900 Mineral Deposit Inventory (MDI) records for southeastern Ontario. During 2001, the District Support Geologist was principally responsible for verifying the MDI database. Other staff continued adding information related to new client property visits. In 2001, 906 MDI files were reviewed. A recurring problem with the database has been the existing records that do not meet the minimum standards for inclusion in the database. In 2001, 104 such records were deleted from the database.

Southern Ontario mineral potential and recommendations for exploration were represented at the annual Prospectors and Developers Association of Canada Convention in Toronto as part of the Ontario Geological Survey poster session. In conjunction with Southwest District staff, a display highlighting "Mining in Southern Ontario, A Billion Dollar Business" was presented at the Northeastern Ontario Mines and Minerals Symposium held in Sudbury in April, and at the Northwestern Ontario Mines and Minerals Symposium held also in April in Thunder Bay. In May, the Resident Geologist and District Geologist for southwest Ontario prepared and presented a display highlighting Ontario Industrial Minerals at the 37th Annual Forum on Industrial Minerals.

SOUTHEAST ONTARIO DISTRICT – 2001

In mid-December, staff attended the Southern Ontario Symposium where a poster display titled "A Billion Dollar Industry – Mineral Resources of Southern Ontario" was presented. The Southern Ontario Regional Resident Geologist and the Southwest District Geologist jointly prepared and presented a talk highlighting current production and potential for additional development of industrial minerals in Southern Ontario.

In early August, a display that focused on Mining and Exploration in Southern Ontario was presented at the Bancroft Gemboree. Thousands of thumbnail-size samples of Southeast Ontario rocks and minerals were distributed. The Southern Ontario Resident Geologist and Southwest District Geologist co-authored a presentation at the Ontario Prospectors Association symposium held in December in Toronto entitled, "Mining In Southern Ontario, A Billion Dollar Business, 2001".

The Southern Ontario Regional Resident Geologist and Southwest District Geologist collaborated with Myra Gerow, MNDM Coordinator, Commodities Program, to present a poster on Industrial Minerals of Ontario at the Blenden Industrial Minerals Forum in Toronto in October.

Staff conducted visits to 44 client properties and mining/mineral processing operations, as well as 4 visits to Conservation Authorities within the District during the 2001 field season. A complete listing of field visits conducted during 2001 is presented in Table 6, the locations of which are illustrated in Figure 3.

Table 6. Field visits completed in 2001 – Southern Ontario Regional Resident Geologist (Southeast). (Field visits within the District are keyed to Figure 3.)

No.	Property/Operation	Commodity
1.	Archibald, J.C. Property Galway Twp.	Vermiculite
2.	Bancroft Chamber of Commerce, Bear Lake Diggings, Monmouth Twp.	Mineral specimens
3.	Belmont Rose Granite quarry, Methuen Twp.	Granite dimension stone, armor stone
4.	Bertus Industrial Property, Griffith Twp.	Marble dimension stone
5.	Birkendale Quarry*	Granite flagstone
6.	Blakely Pyrite minesite, Elzevir Twp.	Past Producer pyrite
7.	Blue Marble property, Galway Twp.	Vermiculite
8.	Canadian Wollastonite, St Lawrence Wollastonite, Pittsburgh Twp.	Wollastonite
9.	Candor Ventures, Madoc Twp.	Gold, Copper
10.	Carmeuse Lime Plant*	Lime
11.	Dofasco Steel Plant*	Steel
12.	Eldorado Gold property, Madoc Twp.	Past Producer gold
13.	Flinton Group, quartz pebble conglomerate, Kaladar Twp.	Scientific Interest, sample collection
14.	Grenville Gold, Grimsthorpe Twp.	Gold, PGE
15.	Highway 62 Rhyolite, Madoc Twp.	Scientific Interest, sample collection
16.	Highwood Resources, Plant, Marmora Twp.	Talc, barite
17.	International Quartz, McClintock Twp.	Crushed stone, landscape stone
18.	Lacey minesite, Loughborough Twp.	Past Producer, Phlogopite
19.	Lafarge Dundas quarry*	Cement
20.	Lakefield Research	Laboratory
21.	Lydia Consolidated Diamonds, Tudor Twp.	Diamonds
22.	Marmorston minesite, Marmora Twp	Past producer Fe, Scientific Interest

No.	Property/Operation	Commodity
23.	McDonald minesite, Monteagle Twp.	Mineral specimens, hazard inspection
24.	Minnesota Minerals, Madoc Twp.	Slate
25.	Norwood esker, Asphodel Twp.	Scientific interest, field trip prep.
26.	Oak Ridges Moraine*	Aggregate
27.	O'Hara Road Conglomerate, Madoc Twp.	Scientific Interest, sample collection
28.	OMYA Canada, Perth Plant, Bathurst Twp.	Calcium carbonate
29.	Ore Chimney property, Barrie Twp.	Gold, Silver
30.	P.R. Engineering*	Oshawa
31.	Farnell claims, Diamond drill core, Galway Twp.	Limestone, vermiculite
32.	Peterborough Drumlin field, Douro Twp.	Scientific interest, field trip prep
33.	Queensborough Talc prospect, Elzevir Twp.	Talc
34.	Richardson Fluorite minesite	Past Producer fluorite
35.	Ross, Bob prospect, Limerick Twp.	Prospect?
36.	Silver Crater minesite, Faraday Twp	Mineral specimens, sample collection
37.	Skinner, Tim property, Watt Twp.*	Quartz prospect
38.	Specialty Aggregate, Dominion Slate quarry, Madoc Twp.	Slate
39.	St. Lawrence Cement, Ogden Pt. Quarry, Cramahe Twp.	Crushed Limestone for cement
40.	Stewart Lake Graphite, Bedford Twp.	Graphite, sample collection
41.	TRT / Lafarge Mouport Pit*	Aggregate
42.	Tudor Gabbro, Tudor Twp.	Scientific Interest, sample collection
43.	Tweed Marble quarry, Hungerford Twp	Marble
44.	Wilson, Mitch property, Camden Twp.	Soapstone
Conservation Areas Visited		
45.	Napanee Conservation Area	
46.	Frink Outdoor Education Centre	
47.	Belleville Conservation Area	
48.	Cataracqui Conversation Area	

* indicates visit outside of District, not shown on Figure 3.

SOUTHEASTERN ONTARIO RESIDENT GEOLOGIST'S DISTRICT

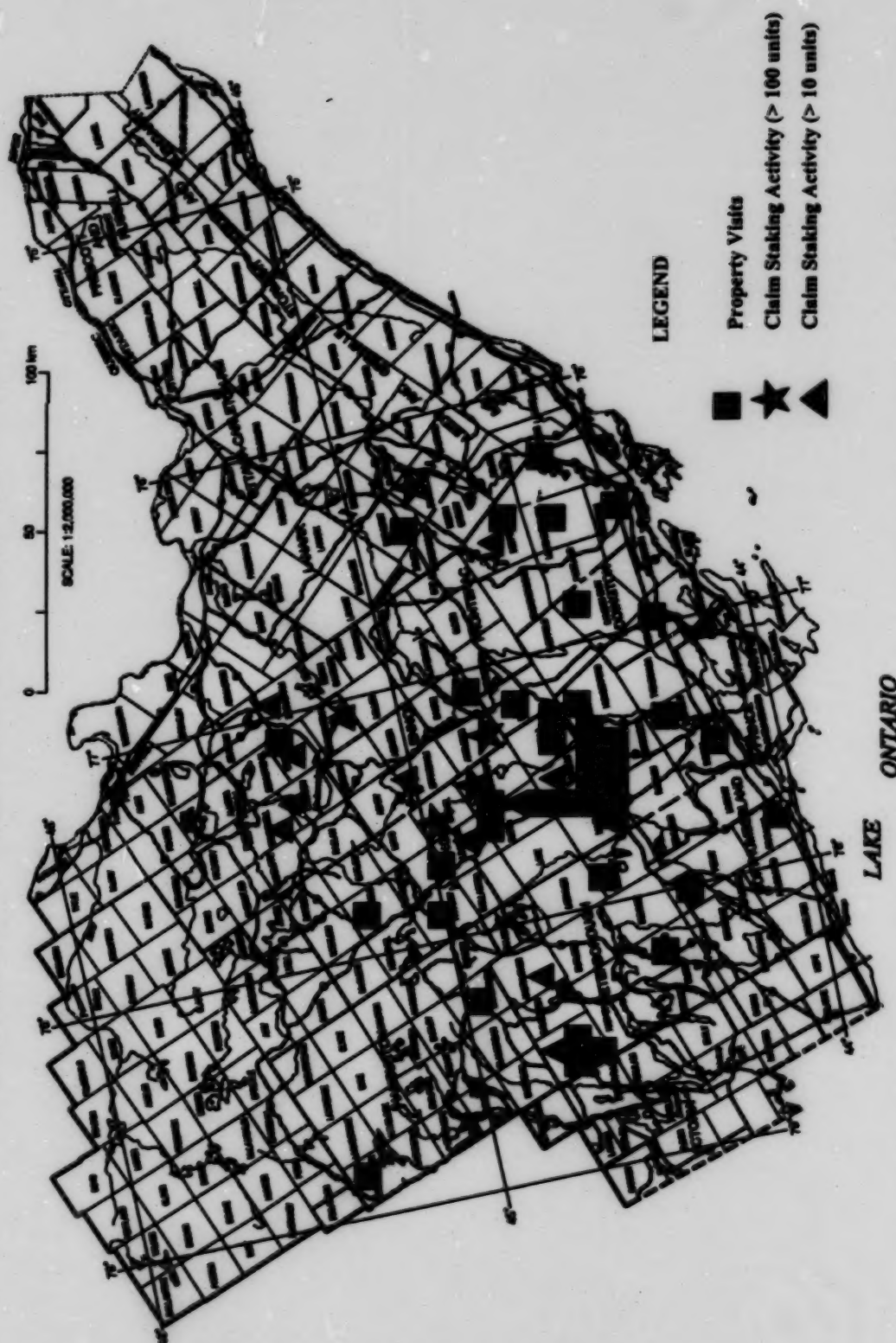


Figure 3: Property Visits and Claim Staking Activity in 2001 - Southeast District, Southern Ontario Regional Resident Geologist Region

During the course of the year, 64 industry assessment reports were processed and added to the Tweed Resident Geologist Program Office assessment file library, (see Table 3, this report). Table 7 provides a summary of Tweed office staff activities and Table 8 lists the publications added to the Tweed office technical library during 2001.

Southern Ontario Prospector's Association (S.O.P.A.)

During 2001, the Tweed Resident Geologist Program Office (TRGPO) continued regular liaison with S.O.P.A. to provide improved service to the client group. In September, the TRGPO organized and co-hosted a heavy mineral sampling workshop for S.O.P.A. members. In addition, Hial Newsome, Senior Manager, RGP, provided an introduction to the Provincially Significant Mineral Potential (PSMP) evaluation process to attendees.

Table 7. Program statistics for 2001 – Southern Ontario Regional Resident Geologist (Southeast).

Activity	1998	1999	2000	2001
Field Investigations/Property Visits	34	45	47	44
Field Trips Given/Field Guide Written	2	4	1	3
MDI Records Revised	0	1550	2690	906
OPAP Recipients	11	22	N/A	N/A
MMAH Presentations	4	3	2	4
Clients Visits to Tweed RGP Office	501	508	676	496
Drill Core Library Users	16	23	31	58
Client Communications/Interactions (Presentations/Poster Sessions)	N/A	2375	2619	3000+
Client Inquiries (Telephone/E-mail/Mail)	2172	2079	2163	2668
OGS Publications Sold	112	73	93	89
Prospector's Licenses Sold	21	10	21	15
Claim/Line Tags Sold	197	408	261	742

Table 8. Library acquisitions, 2001 – Southern Ontario Regional Resident Geologist (Southeast).

Title	Author	Type and Year of Publication
Risk Assessment of Radon in Drinking Water	Committee on Risk Assessment of Exposure to Radon in Drinking Water	National Research Council, Washington, D.C., 296p, 1999
Data Integration for Mineral Exploration, ArcView for Geoscientists	Allen, Iain	Geoscience Information Services, Stouffville, 96p, 1999-2001
Advanced ArcView for Geoscientists	Allen, Iain	Geoscience Information Services, Stouffville, 80p, 1999-2001
Program and Extended Abstracts for the 37 th Forum on the Geology of Industrial Minerals	Simandl, G.J., Holland, J., Dunlop, S. and Rotella, M.	Canadian Institute of Mining, Metallurgy and Petroleum, Victoria, 316p, 2001
Mineral Industry Info-Guide	Mines and Metals Sector	Natural Resources Canada, 108p, 2000
Industrial Minerals 2001, the Southern Ontario 13 th Annual Canadian Conference on Markets for Industrial Minerals		Abstracts, Blendon Publication, Toronto, 2001

SOUTHEAST ONTARIO DISTRICT – 2001

Title	Author	Type and Year of Publication
Superior PGE 2001, CIM Geological Society Field Conference		Abstracts and Field Guide, Canadian Institute of Mining, Metallurgy and Petroleum, Thunder Bay, 2001
The Ontario Meeting of the American Institute of Mining Engineers & their trip to Cobalt, Sudbury & Moose Mountain*		Canadian Mining Journal, Toronto, 89p, circa 1907
Bats and Mines	Tuttle, M.D. and Taylor, D.A.R.	Bat Conservation International, Inc. Resource Publication No. 3, Austin, Texas, 50p, 1998
The Geology of the Parliament Buildings of Canada: Introduction	Vandine, D.	Journal of the Geological Association of Canada, Geoscience Canada Vol. 28, No. 1, Ottawa, p12, March 2001
Building Stones of Canada's Federal Parliament Buildings	Lawrence, D.E.	Journal of the Geological Association of Canada, Geoscience Canada Vol. 28, No. 1, Ottawa, pp13-30, March 2001
The Characterization of Allettite-Bearing Rocks of the Olympus Mine, Stanleyville, Ontario	Sarfi, M., Percival, J.B., Miles, N.M., Ercit, S.T. and Hunt, P.A.	Geological Survey of Canada - Current Research 2001
A Regional Evaluation of the Shale Resource Potential of the Upper Ordovician Queenston Formation, Southern Ontario	Armstrong, D.K.	Ontario Geological Survey, Open File Report 6058, 148p, 2001
A Compilation of References of Kimberlite, Diamond and Related Topics	Sage, R.P. and Gareau, T.	Ontario Geological Survey, Open File Report 6067, 101p, 2001
Report of Activities, 2000, Resident Geologist Program, Red Lake Regional Resident Geologist Report: Red Lake and Kenora Districts	Lichtblau, A., Raoul, A., Ravnaas, C., Storey, C.C., Kosloski, L., Debicki, R. and Drost, A.	Ontario Geological Survey, Open File Report 6047, 109p, 2001
Report of Activities, 2000, Resident Geologist Program, Thunder Bay North Regional Resident Geologist Report: Thunder Bay North District	Mason, J.K., White, G.D., O'Brien, M.S., Komar, C., Stewart, J., Debicki, R. and Drost, A.	Ontario Geological Survey, Open File Report 6048, 56p, 2001
Report of Activities, 2000, Resident Geologist Program, Thunder Bay South Regional Resident Geologist Report: Thunder Bay South District	Schneider, B.R., Scott, J.F., Smyk, M.C., O'Brien, M.S., Debicki, R. and Drost, A.	Ontario Geological Survey, Open File Report 6049, 64p, 2001
Report of Activities, 2000, Resident Geologist Program, Timmins Regional Resident Geologist Report: Timmins and Sault Ste. Marie Districts	Atkinson, B.T., Hailstone, M., Seim, G. Wm., Wilson, A.C., Draper, D.M., Farrow, D., Hope, P., Debicki, R. and Yule, G.	Ontario Geological Survey, Open File Report 6050, 116p, 2001
Report of Activities, 2000, Resident Geologist Program, Kirkland Lake Regional Resident Geologist Report: Kirkland Lake and Sudbury Districts	Meyer, G., Cosco, M., Grabowski, G.P.B., Guindon, D.L., Hailstone, M., Stephenson, C., Wallace, L.M., Debicki, R. and Yule, G.	Ontario Geological Survey, Open File Report 6051, 113p, 2001
Report of Activities, 2000, Resident Geologist Program, Southern Ontario Regional Resident Geologist Report: Southeastern and Southwestern Districts, Mines and Minerals Information Centre and Petroleum Resources Centre	Sangster, P.J., McGuinty, W.J., Papertian, V.C., Steele, K.G., Lee, C.R., Laidlaw, D.A., Carter, T.R., Spears, G.J., Debicki, R. and Rowell, D.	Ontario Geological Survey, Open File Report 6052, 108p, 2001
Summary of Field Work and Other Activities 2001	Baker, C.L., Kelly, R.I. and Parker, J.R. (ed)	Ontario Geological Survey, Open File Report 6070, 2001

*One of a number of historical and technical texts donated by Mr. Archie Watts, Peterborough, Ontario.

PROPERTY EXAMINATIONS

Madoc Township Slate Deposits

In Madoc Township a band of slate extends from Lot 2, Concession V on Highway 7 to Lot 5, Concession VI on Highway 62. Between 1934 and 1939 a total of 938 tons of slate was produced from 2 quarries, one located next to Highway 7 in Lot 2, Concession V (UTM N4930572, E301259), and the other near Highway 62 on Lot 5, Concession VI (N4932973, E302484). The slate quarry on Highway 7, formerly held by Minnesota Minerals Limited was revisited during the summer of 2001. This dark grey slate has a reddish hue on its weathered surface and exhibits a strongly developed cleavage that strikes N60°E.

The water-filled Canada Slate quarry located on Lot 5, Concession VI is accessed from the Stoklosar crushing plant site immediately east of Highway 62. The dark-grey slate is interbedded with slaty conglomeratic beds. The bedding strikes N25°E and dips 40°E. The slaty cleavage strikes N60°E and dips 70°S. The partings in this slate are not as well pronounced as at the Minnesota Minerals site. Dark greenish black euhedral crystals of ottrelite, a manganese-rich chloritoid have been identified in this slate. In 1999, broken slate fragments were crushed and stockpiled in a 1-acre cleared area located south of the water-filled quarry and sold as aggregate.

In the past, slate had been used in numerous construction applications, chiefly as roofing shingles and granules and as industrial fillers. Because of its weather resistance, low porosity and non-slip properties, slate is presently popular for use in both indoor and outdoor applications, as flooring, countertops, fireplaces as well as walkways, driveways, wall-facings, and roofing shingles.

References: Geological Report 73, Hewitt, D.F., Ontario Geological Survey, pp27-28, 1968.

Senator Stone Ltd., Highway 7 Marble Quarry – Elzevir Township

On April 26th, 2001 the Southern Ontario Regional Resident Geologist and the Southeast District Geologist visited the Highway 7 Marble quarry accompanied by J. Palu, Senator Stone. This site is located on Lot 2, Concession 7, Elzevir Township approximately 3 km east of the intersection between Highway 37 and Highway 7. The quarry is located on private property immediately south of Highway 7 and was recently permitted under the Aggregate Resources Act.

The quarry lies in a thin calcitic to dolomitic marble belt that stretches from Actinolite to Kaladar and widens to the east. The belt is bounded by metasedimentary rocks to the north and metamorphosed granites to the south. The dolomitic marble varies in colour from white to buff and is fine to very fine-grained. Additional prospects in the same unit have been evaluated as sources for high purity calcium carbonate.

The surface expression of the quarry is small, as quarrying operations have only commenced recently. An area of approximately 1000 m square has been stripped. Immediately to the west of the quarry is evidence of a much older quarry face. The degree of weathering on the exposed face indicates that it has been inactive for decades.

A portable crusher was operating onsite during the field visit. Dolomitic marble was being crushed to ¾ inch and sorted according to colour for landscape and precast applications. The crushed stone is being shipped to both Toronto and Montreal. Crushing is to be conducted on a seasonal/on-demand basis (C. Papertzan, personal observation, J. Palu, personal communications 2001).

St. Lawrence Cement, Ogden Point Quarry – Cramahe Township

The Southern Ontario Regional Resident Geologist visited the Ogden Pt. Quarry on 2 occasions in June 2001. Middle Ordovician limestone of the Verulam and Lindsay formations of the Simcoe Group is quarried, crushed and shipped via Lake Ontario to the company's cement plant in Mississauga. On average 1.9 Mt to 2.1 Mt of crushed stone is shipped per year.

The quarry has been in operation since 1959 and under current license extraction limits there is another 100 years of potential production from the site. Exploratory drilling indicates 200 years of reserve at the current extraction level. The quarry occupies 250 acres of the 674-acre permitted area and is currently operating to a depth of 30 m.

The quarry operates successfully within the community of Colborne and adjacent to Lake Ontario. All aspects of the operation are closely monitored for environmental, process and quality control. Each blast is monitored to ensure ground vibrations and air pressure readings are well below the legal requirements.

Trilobite, brachiopod and crinoidal fossiliferous debris is common in the upper lift of the quarry within the Lindsay formation. Rare, complete trilobite specimens of up to 35 cm in length have been recovered. Photos of the specimens are on display in the quarry office. The quarry employs 20 people (St. Lawrence Cement, personal communications / personal observations, June 2001; unpublished CIMM field trip guidebook, June 2001; Limestone Industries of Ontario, Vol. III; MDI30N13NW00002).

RECOMMENDATIONS FOR EXPLORATION

There are many high mineral potential areas in southeastern Ontario that remain inadequately explored despite the region's long history of mineral exploration and production. Traditional exploration targets in the Grenville Province of southeastern Ontario have been vein-hosted gold and base metal deposits. In recent decades the focus has also been placed on the search for industrial mineral deposits. Changing technology has resulted in new demand for certain commodities not previously considered to be significant. Table 9 provides a listing of known mineral deposits in southeastern Ontario that are not currently being mined. Please refer to Tables 11, 12, 13 and 14 of this report for historic mineral production statistics.

Mineral Fillers and Extenders

An ideal mineral filler substance is inert, has consistent properties, a low specific gravity, is non-toxic, non-hazardous, non-abrasive and can be produced at a relatively low cost. Fillers reduce the consumption of more expensive raw materials such as wood fiber or plastic resin. Extenders enhance the final product by improving properties such as strength, flexibility and weight. The use of finely ground minerals as fillers and extenders in manufactured products has rapidly grown to become a multi-billion-dollar industry in North America alone.

With major production of calcium carbonate, talc and nepheline syenite, southeastern Ontario is already the site of a vital mineral filler industry. Further evaluation of other minerals as fillers and extenders including, but not limited to, mica, titanium, wollastonite, calcite, and vermiculite is recommended. There is a wealth of information published by the Ontario Geological Survey (OGS) on many potential mineral filler deposits in southeastern Ontario. Table 10, this report, supplies a listing of known titanium, tantalum and REE occurrences in southeastern Ontario. In the spring of 2002, the OGS will release results of a study evaluating the potential of approximately 200 mica occurrences found in southern Ontario. The study was successful in identifying both a market for Ontario muscovite and highly prospective areas for muscovite in southeastern Ontario.

Dimension Stone

GRANITE FLAGSTONE, CENTRAL GNEISS BELT / LIMESTONE FLAGSTONE, GULL RIVER FORMATION

The suitability of a particular stone for use as dimension stone is governed primarily by physical properties and by aesthetic appeal. Flagstone consists of thin slabs of stone used for a variety of applications including paving, landscaping, facing, walls and floors. Current producers of granite and limestone flagstone are unable to meet the growing demand for such products.

Any naturally fissile stone may be exploited as flagstone, provided that it has sufficient abrasion resistance.

Flagstone slabs are generally 25 to 76 mm thick but may be thicker or thinner depending on the end use. Slabs may be cut into rectangular shapes or produced in naturally irregular shapes. Existing quarries in the west part of the District extract limestone from the Upper Member of the Gull River Formation. The unit's shaly limestone partings make it an excellent source of limestone flagstone. Further exploration for potential flagstone deposits is recommended.

Several granite dimension stone prospects originally evaluated during MNDM building stone surveys of the 1980s were not deemed suitable for quarry blocks but may have potential for granite flagstone. Further examination of these documented sites for a source of granite flagging is recommended.

Graphite

With new applications and technical advances the demand for graphite is predicted to rise dramatically in the near future. Metallic properties include thermal and electrical conductivity. Non-metallic properties include inertness, high thermal resistance and lubricity. Current major end uses of graphite include high-temperature lubricants, brushes for electrical motors, friction materials, moderator for nuclear reactions, battery and fuel cells. It is presently used in conductive plastics and rubbers, anti-static plastics, semi-conductive cable compounds, high voltage power cable conductive shields, membrane switches and resistors and in the electrostatic coating of plastics. Potential end-uses of highly conductive plastics include de-icing and de-misting applications, heating applications, wire and cable integration, solder replacement, circuit board replacement, fuel cells and heated paving.

Although there are currently no producing graphite mines in the province, several major flake graphite occurrences are located in southeastern Ontario within the Frontenac Axis, a subdivision of the Central Metasedimentary Belt. There are 3 inactive graphite deposits in southeastern Ontario with known reserves. Please refer to Table 9 for additional information. There are 187 occurrences of graphite listed in the Mineral Deposit Inventory database for this area. Exploration for graphite including re-examination of known deposits in southeastern Ontario is recommended.

Table 9. Mineral deposits not currently being mined, 2001* – Southern Ontario Regional Resident Geologist (Southeast).

Deposit/Township	MDI Number	Status	Commodity	Reserves	Reserve Reference
Ore Chimney Prospect Barrie Township	MDI31C14SE-00142 (SO 1130)	I	Ag, Au, Zn, Pb	11 000 tons above 500 foot level avg. 0.2 oz Au, 5.64 oz Ag, 2.0% Zn, 1.0% Pb	MDC 12 p132 MDC 18 p33
Macassa Nickel Limerick Township	MDI31C13SE-00099 (SO 0595)	I	Ni, Cu	2 000 000 tons @ 1.0% Ni, 0.25% Cu	MDC 12 p138
Renfrew Zinc (Renprior) Admaston Township	MDI31F07NE-00063 (SO 0286)	A	Zn	16 000 tons @ 10.5% Zn to a depth of 30 m Breakwater Resources optioned to Noranda Mining and Exploration 1996	MDC 12 p226 MDC 20 p17
Harvey Simon Prospect Lyndoch Township	MDI31F03NW-00044 (SO 0259)	I	Cu, Fe, Zn	250 000 tons @ 1.1% Cu to 350 feet	MDC 12 p226 MDC 20 p45
Clyde Forks Deposit Lavant Township	MDI31F02SE-00064 (SO 0351)	I	Cu, Sb, Ag, Hg	60 000 tons 0.67% Cu, 0.37.0% Sb, 0.03% Hg, 1.32 oz/ton Ag	MDC 20 p36
Twin Lakes Diorite Methuen Township	MDI31C12NW-00114 (SO 3840)	I	Ti	13.2 million tonnes of 21.7% TiO ₂ , recoverable from open pit to -165 m, with rock: ore ratio = 0: 54	CIM Bulletin, Vol. 83, No. 934, p99
Grattan Deposit Grattan Township	MDI31F06NE-00017 (SO 0270)	I	Fe	Proven – 3 639 600 tons to a vein depth of 363 feet Indicated 9 099 000 tons to a vertical depth of 600 feet @ avg. 27.74% Fe	MDC 20 p98

SOUTHEAST ONTARIO DISTRICT - 2001

Deposit/Township	MDI Number	Status	Commodity	Reserves	Reserve Reference
Radenhurst-Caldwell Deposit Lavant Township	MDI31F02NE-00012 (SO 0349)	I	Fe	Main lens 2000 feet long by 31.3 feet wide contains 6500 tons per slope foot at grade of 32.77% Fe; 3 additional zones totaling 1600 feet in length avg. 17%, 16.7% and 25.5% Fe respectively	MDC 20 p104
Bessemer Deposit Mayo Township	MDI31F04SE-00012 (SO 0235)	I	Fe	No.4 deposit 2 480 819 tons @ 28.62% recoverable Fe	MDC 20 p110
Childs Deposit Mayo Township	MDI31F04SE-00013 (SO 0236)	I	Fe	6 193 330 tons @ 19.25% recoverable Fe	MDC 20 p114
Tomclid Magnetite South Canonto Township	MDI31F02SW-00032 (SO0282)	I	Fe	Published in 1993 an estimated 3 million tonnes averaging 40% Fe, has not been adjusted to reflect production from deposit in late-1990's	MP 161 p377
Calabogie Magnetite Property Algoma Ore Prop. Ltd. Bagot Township	MDI31F07SE-00009 (SO 0353)	I	Fe	Reserves of 45 million tons @ 25% Fe to 500 feet and 28% Fe to 1000 feet.	MDC 11 p314
Buckhorn Deposit Bagot Township	MDI31F07NE-00069 (SO0362)	I	Mo	Largest of numerous small lenses contains 1 500 tons @ 1% MoS ₂	MDC 20 p132
Bannockburn (Madoc Mining Company Ltd.) Madoc Township	MDB31C12NE-00195 (SO 7274)	I	Au	225 000 T grading 0.267 oz/ton Au	MP 161 p 377
Cooper Spruce Ridge Resources Ltd. Elzevir Township	MDB31C11SW-00044 (SO 2679)	I	Au, Talc	3 Mt @ 30-33% recoverable talc and 40 000 t @ 8 gpt Au	OFR 5945 P 92 OFR 5808 P 79
Dingman Deposit Deloro Minerals Ltd. Marmora Township	MDI31C12SE-00040 (SO 3590)	A	Au	7 Mt @ 1.8 gpt Au	OFR 5958 P 11 13
Hawley Ram Petroleum Limited Olden Township	MDB31C10NW-00117 (SO 4057)	A	Wollastonite	2.5 Mt @ 32% wollastonite to a vertical depth of 75 m	OFR 5943 P 337
Marmora Gitenes Exploration Inc. Marmora Township	MDB31C12SE-00096 (SO 3729)	I	Wollastonite	450 000 t (open pit) @ 47% wollastonite, plus 680 000 t @ 39% wollastonite in a separate zone	OFR 5715 P 50
Trudeau C. Roger Young Hungerford Township	MDB31C11SW-00049 (SO 1192)	A	Calcite, Dolomite	4 Mt high-purity dolomite. No estimate available for calcite zone	OFR 5958 p. 11-11
Verona-Kirkham Stewart Lake Resources Inc. Bedford Township	MDI31C10SE-00023 (SO 1244)	I	Graphite	1.6 Mt grading 9.5% graphite in 2 separate zones	MDC 33 p 16
Cal Graphite Corp. Butt Township	MDB31E11NE-00004 (N0129)	I	Graphite	Reserves of 60 Mt grading 3% graphitic carbon	MDC 33 p 10
Globe Graphite Mine North Elmsley Township	MDI31C16SE-00016 (SO 1604)	I	Graphite	500 000 t of approximately 7% graphite below mined out portion, to the 300 feet level.	MDC 33 p 25
St. Lawrence Pacific Coast Mines Inc. Pittsburgh Township	MDI31C08NW-00058 (SO 8487)	I	Wollastonite	9-11 Mt @ 43% wollastonite; 4-5 Mt @ 34% wollastonite	MNDM www 1997

*(Table does not include nepheline syenite, trap rock, REE and dimension stone deposits.)

Code: I = Inactive, A = Active

Table 10. Titanium, tantalum, REE occurrences compiled from MDI-2 database – Southern Ontario Regional Resident Geologist (Southeast).

Name	Township	MDI	Commodity	Deposit Status
Harrington, Marsh Ore Bed	Marmora	MDI31C05NE00135	Au, Fe, Ti	Occurrence
Green Island Rutile	Huntingdon	MDI31C06NW00088	Ti	Occurrence
Matthews, Newboro Lake	North Crosby	MDI31C09NW00009	Fe, Ti	Past Producer with Reserves
Chaffey	South Crosby	MDI31C09NW00011	Fe, Ti	Past Producer with Reserves
Tommy Lake	North Crosby	MDI31C09NW00131	Ti	Occurrence
Ricketts	Lake	MDI31C12NE00109	Fe, Ti	Occurrence
Orton	Tudor	MDI31C12NE00122	Fe, Ti	Past Producer w/o Reserves
Hastings Road Magnetite	Tudor	MDI31C12NE00185	Fe, Ti	Occurrence
Harold White, Twin Lake	Methuen	MDI31C12NW00114	Fe, Ti	Occurrence
Horse Lake, Tripp	Methuen	MDI31C12NW00127	Fe, Ti	Occurrence
Maloney	Marmora	MDI31C12SW00002	Cr, Cu, Fe, Ni, Ti	Past Producer w/o Reserves
Canadian Nickel	Methuen	MDI31C12SW00121	Ti	Occurrence
Ridgway	Marmora	MDI31C12SW00122	Cu, Fe, Ti	Occurrence
Jocko Lake	Limerick	MDI31C13NE00107	Fe, Ti	Occurrence
Umfraville	Wollaston	MDI31C13NW00057	Co, Fe, Phosphate, Ti	Occurrence
Canning Lake	Minden	MDI31D15NE00052	Fe, Ti	Occurrence
Pine Lake	Glamorgan	MDI31D16NW00215	Fe, Ni, Ti, V	Occurrence
Basin, Silver Crater (Basin)	Faraday	MDI31E01SE00054	Mica, Mo, Nb, Th, U, Ti	Past Producer w/o Reserves
Allen Lake	Harcourt	MDI31E01SE00306	Fe, Ti	Occurrence
Gal-Wood	Sabine	MDI31E08NE00010	Gd, Nb, Ta, Ti, U	Occurrence
Woodcox	Monteagle	MDI31F04NW00020	Ce, Feldspar, Nb, U, Ta, Th, Ti, Zircon	Past Producer w/o Reserves
Macdonald Mine	Monteagle	MDI31F04NW00023	Cu, Feldspar, Mo, Nb, REE, Th, Ti, U, Zircon	Past Producer w/o Reserves
Opeongo	Sebastopol	MDI31F06NE00093	Ag, Ce, Nb, Ta, Th, Ti, U, Y, Zircon	Occurrence
East Rockingham	Brudenell	MDI31F06NW00085	Au, Ti	Occurrence
South Lamberts	Griffith	MDI31F06SE00161	Ti	Occurrence
Horton Twp, Ottawa River	Horton	MDI31F10SE00019	Fe, Ti	Occurrence
Mahoney and Morin	Sabine	MDI31E08SE00002	Feldspar, Nb, REE, Ta, U	Past Producer w/o Reserves
Genesee No. 2 South	Monteagle	MDI31F04NW00018	Feldspar, Nb, Si, Ta, Th, U	Past Producer with Reserves
Plunkett, Plunkett South	Monteagle	MDI31F04NW00019	Ce, Feldspar, Amethyst, Mo, Nb, Th, Ta, U	Past Producer w/o Reserves
Dubblestein	Bangor	MDI31F05SW00010	Nb, Ta, Th, U	Occurrence
Tooeys Lake, Tooley Lake	Brougham	MDI31F06SE00090	Nb, Ta, Th, U	Occurrence

SOUTHEAST ONTARIO DISTRICT - 2001

Name	Towaship	MDI	Commodity	Deposit Status
Renfrew Minerals, Wal-Gem West Quarry	Lyndoch	MDI31F06SW00013	Be, Feldspar, Fluorite, Mo, Nb, REE, Si, Ta, Th, U, Zircon	Producing Mine
Barr Feldspar Quarry, Woernke	Fraser	MDI31F14SW00003	Ce, Feldspar, Nb, Ta, Th, U	Past Producer w/o Reserves
Quinn	Olden	MDI31C10NW00366	Cu, Ni, REE	Occurrence
Orser-Kraft	South Sherbrooke	MDI31C15SE00027	Feldspar, Nb, REE, Th, U	Past Producer w/o Reserves
Nobles Bay, Rogers, J.	North Burgess	MDI31C16SE00004	Mica, REE	Past Producer w/o Reserves
Maclaren, Willaim L.	North Burgess	MDI31C16SW00017	Mica, Phosphate, REE	Past Producer w/o Reserves
Christie Lake	South Sherbrooke	MDI31C16SW00142	Magnetite, Nb, REE	Occurrence
Drude South	Cavendish	MDI31D09NW00079	REE, Th, U	Occurrence
Copper Anomaly	Lutterworth	MDI31D15SE00151	Cu, REE, Sr, Zircon	Occurrence
Rare Earth Anomaly	Lutterworth	MDI31D15SE00152	Cu, REE, Sr, Zircon	Occurrence
North Rare Earth Anomaly	Lutterworth	MDI31D15SE00153	Cu, REE, Sr, Zircon	Occurrence
Laurencin, Milhol	Cardiff	MDI31D16NE00160	Mo, REE, Th, U	Occurrence
McLennan, J.G.	Peck	MDI31E07NE00006	Nb, REE	Occurrence
Malcovitch, P.	Clyde	MDI31E08NW00003	Ce, REE, U	Occurrence
Gole, J.G.	Murchison	MDI31E09SE00004	Feldspar, Nb, REE, Si, U, Zircon	Past Producer w/o Reserves
Cameron and Aleck	Murchison	MDI31E09SE00005	Feldspar, Nb, REE	Past Producer w/o Reserves
D'Eldona, Yankee Dam	Butt	MDI31E11NE00070	Nb, REE, U	Occurrence
Plunkett North	Monteagle	MDI31F04NW00185	Feldspar, REE, U	Occurrence
Lake Clear	Sebastopol	MDI31F06NE00092	REE, Th, U	Occurrence
Price, E.C., Quadeville	Lyndoch	MDI31F06SW00014	Be, Feldspar, Fluorite, Nb, Phosphate, REE, Si, Th, U, Zircon	Producing Mine
Universal Light Metals	Lyndoch	MDI31F06SW00065	Be, Ce, Nb, REE, Th, U	Occurrence
Lake Property, Lake Mine	Dickens	MDI31F12SW00006	Feldspar, REE	Past Producer w/o Reserves

Note: MDI-2 database was queried for Ti, Ta and REE occurrences. This listing indicates the presence of the commodities, not necessarily their order of abundance. This list should be used as a preliminary guide. Hard copies of these complete MDI files are located at RG office in Tweed.

Table 11. Historic production of gold – Southern Ontario Regional Resident Geologist (Southeast).

Mine	Township	Operating	Tons Milled	Ounces Produced	Grade (oz/ton)
Big Dipper	Barrie	1907-09	52	17	0.33
Cook	Marmora	1901-04	1483	289	0.26
Cordova	Belmont	1892	120 670	22 774	0.19
Craig	Tudor	1905-06	1850	248	0.13
Deloro	Marmora	1897-02	39 143	10 360	0.26
Gatling 5 Acre	Marmora	1900-03	6114	2353	0.38
Gilmour	Grimsthorpe	1909-10	550	172	0.31
Golden Fleece	Kaladar	1919-22	Unknown	480	Unknown
Ledyard	Belmont	1893-94	55	13	0.24
Pearce	Marmora	1893-08	239	302	1.26
Sophia	Madoc	1900-41	1800	110	0.06
Sovereign	Marmora	1878	Unknown	970	Unknown
		1892-92-00	1 962	370	0.19
Star of the East	Barrie	1905-07	976	134	0.14
Total			174 894	38 592	

Table 12. Historic production of copper, lead and zinc – Southern Ontario Regional Resident Geologist (Southeast).

Mine	Twp.	Operating	Tons Milled	Production
Kingdon	Fitzroy	1884-85, 1914-31	905 000	76 821 409 lbs Pb conc., 857 312 lbs Zn conc., 60 074 072 lbs Pb rec
Long Lake	Olden	1897-25, 1973-74	3 442, NA	\$41 550 ore value, 9467 tons Zn valued at \$1 227 000
Eldorado Copper	Madoc	1906	NA	234 000 lbs copper matte containing 230 oz Au, 182 oz Ag, 109 000 lbs Cu
Hollandia Lead	Madoc	1903-06	NA	2 653 365 lbs Pb

Table 13. Historic production of iron – Southern Ontario Regional Resident Geologist (Southeast).

Mine	Township	Operating	Tons Milled	Grade (% Fe)
Calabogie	Bagot	1883-1901	10 000	26
Martel	Bagot	Pre 1890	2 000	58.71
Williams (Black Bay)	Bagot	1880-90	25 000	51.89
Black Lake	Bedford	1882-1884	4 000	40
Glendower	Bedford	1873-1895	50 000	50-60
Belmont (Ledyard)	Belmont	1899-1900, 1911-1913	8 433	51.2
Blairton	Belmont	1820-1875	300 000	51.8
Playfair (Dalhousie)	Dalhousie	1866-71	11 100	57.6

SOUTHEAST ONTARIO DISTRICT - 2001

Mine	Township	Operating	Tons Milled	Grade (% Fe)
Radnor	Grattan	1901-1907	18 824	47.5
Eagle Lake (Blessington)	Hinchinbrooke	1887-1891	700	65.55
Tomahawk (Mag-Iron)	Lake	1947, 1950-57	2 096	50.9
Wilbur	Lavant	Pre 1900, 1907-8	146 892	56.69
Magnetawan	Lount	1910-1912	6 000	59.55
Paxton	Lutterworth	Before 1910	1 000	NA
Miller	Madoc	1899	6 823	NA
Wallbridge	Madoc	1900-01, 1919, 1921	3 421	NA
Marmorston	Marmora	1952-1978	28 000 000	40
Bessemer	Mayo	1902-13	99 613	42.18
Childs	Mayo	1913	9 649	38.7
McNab	McNab	1873-74	15 000	68
Robertsville & Mary	Palmerston	1895, 1900-1, 1918-9	13 477	70.5
Fournier	S. Sherbrooke	1873	600	60
Howland	Snowdon	1880-2	1 500	58
Victoria	Snowdon	1882	?	58.35
Dog Lake	Storrington	1899	600	51.12
St. Charles	Tudor	1900-02	5 186	57-60
Coe Hill	Wollaston	1884-1914	100 000	51.4
Total			28 841 914	

Table 14. Historic production of fluorite in the Southern Ontario Regional Resident Geologist District (Southeast).

Mine	MDI Number	Township	Operating	Total Production (Tons)
Bailey	31C06NW00003	Madoc	1907, 1916, 1917, 1944-50	25 000
Blakely	31C06NW00019	Huntingdon	1918-20, 1928, 1941-47	5026
Coe	31C06NW00008	Huntingdon	1941-42	114
Dwyer	31E01SE00091	Cardiff	1918-20, 1943, 1944	97
Herrington South	31C05NE00009	Huntingdon	1917	13
Howard, Fred Hill	31C06NW00014	Huntingdon	1918, 1920, 1929, 1940-42, 1944	2500
Johnston	31C06NW00013	Huntingdon	1943, 1944-47, 1949	187
Keene	31C06NW00004	Huntingdon	1918-19, 1943, 1944, 1950	5000
Kilpatrick	31C06NW00005	Huntingdon	1944, 1953-1959	11 566
Lee Junior	31C05NE00008	Madoc	1917, 1940, 1943-45	2000
Lee Senior	31C05NE00006	Madoc	1916-1918, 1942, 1943	1600
McIlroy	31C05NE00003	Madoc	1917-18, 1923, 1944	540
Miller	31C05NE00005	Madoc	1917-1919	460

Mine	MDI Number	Township	Operating	Total Production (Tons)
Noyes	31C06NW00011	Huntingdon	1917-20, 1941-43	25 000
Palmateer	31C06NW00016	Huntingdon	1942	44
Perry	31C06NW00009	Huntingdon	1915-20, 1941-43	8000
Perry Lake	31C06NW00007	Huntingdon	1910, 1913, 1915, 1917, 1952, 1960	4000
Ponton	31C05NE00004	Madoc	1929-1942	1300
Rogers	31C06NW00018	Huntingdon	1909-1914, 1943-51	45 000
Rooks	31C12SE00003	Madoc	1916-18	100
South Reynolds	31C06NW00010	Huntingdon	1917-18, 1943	100
Wallbridge & Herrington	31C05NE00007	Madoc	1920-1922, 1941-1943	6600
William Reynolds	31C12SE00002	Madoc	1941-42	88

Fluorspar, a commercial fluorite product, is used as a flux in the making of steel and ceramics, as a constituent in the electrolytic process of making aluminum and in the production of hydrofluoric acid (HF). During World War II, a Canadian Government assistance program, in the form of loans and drill hole explorations, stimulated development of the Madoc deposits (G. Guillet, IMR 12, p.1).

OGS ACTIVITIES AND RESEARCH BY OTHERS

Operation Treasure Hunt - Industrial Mineral Project

The consulting firm of Watts, Griffis and McOuat was the successful bidder in a call for proposals to assess the potential of white mica in southern and central Ontario. The project included field and laboratory examination of known deposits and a detailed market study. Although the project was essentially completed in 2000, additional analysis of selected samples was completed in 2001. Maps, reports and databases will be published in 2002.

Potential for Platinum Group Elements Mineralization in Mafic-Ultramafic Intrusions in Ontario

In January 2001, an Operation Treasure Hunt project designed to study the "Potential for Platinum Group Elements Mineralization in Mafic-Ultramafic Intrusions" was initiated. Eight intrusions in the Southeast District were investigated including Killer Creek, Lavant, Leo Lake, Mountain Grove, Raglan Hills, Tudor and Wolf Lake. For a complete description of the project please, refer to Ontario Geological Survey Open File Report 6070, Summary of Fieldwork and Other Activities 2001. Final products from the project will be released in March and April 2002.

Table 15. Publications of Ontario Geological Survey, 2001 – Southern Ontario Regional Resident Geologist (Southeast).

Title	Author	Type and Number of Publication
Geology and Mineral Potential of the Puzzle Lake Area, Central Metasedimentary Belt, Grenville Province	Easton, R.M.	Open File Report 6064
Geology of the Wicklow Area, Hastings County	Breaks, F.W. and Thivierge, R.H.	Report 288 with Map 2550
Precambrian Geology, Bon Echo Provincial Park	Easton, R.M., Ford, F.D., van Haften, S. and Smedley, J.A.	Preliminary Map P.3270, 1:20 000
Precambrian Geology, Denbigh Area	Lumbers, S.B. and Vertolli, V.M.	Preliminary Map P.3437, scale 1:50 000
Precambrian Geology, Elzevir Area (North Half)	Di Prisco, G., Hammar, J. and Easton, R.M.	Preliminary Map P.3180, scale 1:20 000

Title	Author	Type and Number of Publication
Precambrian Geology, Elzevir Area (South Half)	Di Prisco, G., Hammar, J. and Easton, R.M.	Preliminary Map P.3181, scale 1:20 000
Precambrian Geology, Haliburton Area*	Easton, R.M.	Preliminary Map P.3416, scale 1:50 000,
Precambrian Geology, Minden Area*	Easton, R.M.	Preliminary Map P.3415, scale 1:50 000
Precambrian Geology, Wicklow Area	Breaks, F.W. and Thivierge R.H.	Map 2550, scale 1:20 000
Summary of Fieldwork and Other Activities 2001, Ontario Geological Survey	Baker, C.L., Kelly, R.L., Parker, J.R.	Open File Report 6070
Report of Activities 2000, Resident Geologist Program, Southern Ontario Regional Resident Geologist Report: Southeastern and Southwestern Districts, Mines and Minerals Information Centre, and Petroleum Resources Centre	Sangster, P.J., McGuinty, W.J., Papertzi, V.C., Steele, K.G., Lee, C.R., Laidlaw, D.A., Carter, T.R., Spears, G.J., Debicki, R. and Rowell, D.	Open File Report 6052

* These maps are part of a series of 15 maps (Maps P.3402 to P.3416) that detail the Precambrian geology of the Bancroft and Huntsville areas. Mapping by S.B. Lumbers in conjunction with the Royal Ontario Museum 1989-1993.

Petrography and Mineralogy of an Ultrabasic Dyke of Kimberlitic Affinity at Varty Lake, Ontario

In 2001, M. Sarfi completed an honors thesis at Carleton University, "the Petrography and Mineralogy of an Ultrabasic Dyke of Kimberlitic Affinity at Varty Lake, Ontario." The report investigates the kimberlitic vs. lamprophyric affinities of an ultrabasic dyke in Camden Township, north of Kingston. Previously published studies had disagreed. This current research combined petrography, whole-rock geochemistry and mineral chemistry to confirm the Varty Lake ultrabasic as a kimberlite. A copy of the thesis is available for examination at the Resident Geologist Program office in Tweed (Sarfi, M. 2001, The Petrography and Mineralogy of an Ultrabasic Dyke of Kimberlitic Affinity at Varty Lake, Ontario).

Structural Field Mapping, Structural Petrography and Geochemistry of the Addington Granite

Ph.D. candidate, John Burke, began a study of the Addington Granite, a major unit of the southern section of the Mazinaw Terrane, under the supervision of P. Robin and W.M. Schwerdtner, Department of Geology, University of Toronto. The project will examine the Addington Granite, its internal structure and relationships to other rocks in the same southern section of the Mazinaw Terrane. Focus will be placed on the Addington Granite, the nature of its contacts with its various hosts, mechanisms of igneous emplacement, and the nature of its deformation, both during and after its emplacement. The examination will involve structural field mapping, structural petrography and geochemical analysis (J. Burke, W.M. Schwerdtner, personal communications, 2001).

REFERENCES

- Debicki, R., Drost, A., Rowell, D. and Yule, G. 2002. Report of Activities 2001, Resident Geologist Program, Regional Land Use Geologist Report: Northwestern, Northeastern and Southern Ontario Regions; Ontario Geological Survey, Open File Report 6085.
- Derry, Michener, Booth and Wahl and Ontario Geological Survey 1989. Limestone Industries of Ontario Volume II and III; Ontario Ministry of Natural Resources, Land Management Branch.
- Easton, R.M. 1992. Metallogeny of the Grenville Province; in *Geology of Ontario*, Ontario Geological Survey, Special Volume 4, Part 2, p.1217-1252.
- Harburn, P. 1996. Industrial Minerals, A Global Geology; Industrial Minerals Information Ltd., Surrey, UK 462p.

- Hewitt, D.F. 1967. Pegmatite Mineral Resources of Ontario; Industrial Mineral Report 21.
- LeBarron, P.S. et al 1993. Southeastern Ontario Resident Geologist District - 1992; *in* Report of Activities 1992, Resident Geologists, Ontario Geological Survey, Miscellaneous Paper 161, p. 371-391.
- MacKinnon, A. 1992. Graphite Occurrences of the Frontenac Axis, eastern Ontario; Ontario Geological Survey, Mineral Deposits Circular 33, 31p.
- Sangster, P.J. et al. 2001. Report of Activities, 2000, Resident Geologist Program, Southern Ontario Regional Resident Geologist Report: Southeastern and Southwestern Districts, Mines and Minerals Information Centre and Petroleum Resources Centre; Ontario Geological Survey, Open File Report 6052, 108p.
- Steele, K.G. et al. 2001. 4M - Milling, Moraine, Metallurgical, Mining; unpublished field guide, CIM Toronto Branch, 20p.
- USGS 2000. Mineral Commodity Summaries.





**Ontario Geological Survey
Regional Resident Geologist Program**

**Southern Ontario Regional Resident Geologist
(Southwest Ontario District)—2001**

by

K.G. Steele and M. Barua

2002

CONTENTS

Southern Ontario Regional Resident Geologist (Southwest Ontario District)-2001

INTRODUCTION	1
MINING ACTIVITY	1
Producers/Recent Developments	2
Salt	2
Gypsum	2
Cement	3
Clay/Shale Products	3
Chemical, Metallurgical and Filler Limestone and Dolostone Products.....	4
Dimension/Building Stone	8
ADVANCED EXPLORATION AND DEVELOPMENT	9
Dimension/Landscape Stone.....	9
Greenock High-Calcium Limestone Quarry	9
EXPLORATION ACTIVITY	9
RESIDENT GEOLOGIST STAFF AND ACTIVITIES.....	9
Property Examinations/Company Contacts.....	10
Field Trips and Publications	11
Conferences and Meetings.....	12
Land Use Planning.....	14
Public Education.....	14
RECOMMENDATIONS FOR EXPLORATION.....	15
Queenston Shale	15
Eramosa Dimension and Landscape Stone	16
Gull River Limestone Dimension and Landscape Stone.....	16
Guelph Formation Dolostone.....	17
OGS ACTIVITIES AND RESEARCH BY OTHERS.....	17
ACKNOWLEDGEMENTS	18
REFERENCES.....	18

Figures

1. Producing Mines and Quarries - Southwest Ontario District, 2001.....	20
---	----

Tables

1. Selected industrial mineral production in Ontario.....	22
2. Mine production and reserves in the Southwest Ontario District	23
3. Property visits conducted by the Southwest Ontario District Geologists in 2001	24
4. New OGS and GSC publications on Southwest Ontario released in 2001	25
5. Selected publications received in 2001 by the Southwest Ontario District Geology Office	26
6. Mineral deposits not being mined in the Southwest Ontario District in 2001	27

Southern Ontario Regional Resident Geologist (Southwest Ontario District)—2001

K.G. Steele¹ and M. Barua²

¹ District Geologist, Southwest Ontario District, Ontario Geological Survey

² Acting District Support Geologist, Southwest Ontario District, Ontario Geological Survey

INTRODUCTION

In 2001, the mining and quarrying of minerals in the Southwest Ontario District resulted in over 1.25 billion dollars of economic activity. Four mines, 37 quarries and 3 brine well fields extracted industrial minerals, non-aggregate stone and building stone throughout the year. Most of Ontario's production of salt, gypsum/wallboard, shale/brick, lime, cement, sand and gravel, and stone comes from the Southwest Ontario District. Throughout the year, the demand for clay brick, cement, building stone, and aggregate was very strong. During the year, both Canada Brick and Brampton Brick started up increased production capacity. New building stone quarries are on the horizon. The blustery winter of 2000-2001 resulted in a significant increase in salt extraction.

In 2001, Southwest Ontario District staff visited 35 mineral extraction or processing sites, provided 3 field trips for industry clients, and made presentations at 5 conferences and trade shows. In addition to industry activities, staff was involved in a variety of land use planning, public education and general inquiry tasks.

Recommendations are presented for the exploration of landscaping/dimension stone in the Warton and Orillia areas, plus opportunities for shale and high-purity dolostone resources. Ontario Geological Survey staff, projects and publications provide valuable reference assets for understanding and developing the rich mineral resources of southwest Ontario.

MINING ACTIVITY

In 2000 (the last year for which statistics are available – see Table 1), the mining and quarrying of industrial minerals in the Southwest Ontario District generated approximately \$1.33 billion of production value, or approximately 23% of Ontario's overall revenues from mineral production. If the value of Ontario's oil and gas production is included, all of which occurs in the Southwest Ontario District, mineral production revenues for the District represents over 25% of Ontario's total mineral resources production value. All of the province's salt and gypsum production, almost all of the clay/shale products and lime production, as well as a large percentage of the cement, sand and gravel, and stone production comes from the Southwest Ontario District.

The locations of all active mineral extraction operations in southwest Ontario are shown on Figure 1. The mines, quarries and brine well fields listed extract a variety of commodities for numerous end products, including salt (road salt, chemicals, food), gypsum (wallboard), limestone (lime, cement, glass, steel, building stone), shale (cement, bricks), dolostone (chemicals, glass, steel, building stone), and sandstone (building stone) and gneiss (building stone). Operations that extract construction aggregate or petroleum products are not included.

Reported production figures for the 2 underground salt mines and 2 underground gypsum mines operating in the Southwest Ontario District are presented in Table 2.

A significant portion of Canada's aggregates industry is situated in Southwest Ontario District. According to *Aggregates & Roadbuilding* (July 2001), seven of the country's top 20 quarries are found within the District, including the country's largest aggregate operation - Dufferin Aggregate's Milton Quarry, which reported 5.9 million tonnes of material having been extracted in 2000.

All of the province's oil and gas production occurs in the area that stretches from Niagara Falls to Windsor-Sarnia. Annual production is approximately 15 billion cubic feet of gas and 1.5 million barrels of crude oil. In total, there are approximately 1200 gas wells and 1100 oil wells producing in the province.

Producers/Recent Developments

SALT

In 2001, three companies extracted salt in Ontario, all within the Southwest Ontario District (Figure 1). Sifto Canada Inc., located at Goderich and The Canadian Salt Company Limited, located in south Windsor operate both rock salt mines and brine well fields. General Chemical Canada Limited operated a brine well field, south of Windsor near Amherstburg until approximately March 2001.

Rock salt production increased significantly from previous years due to the high demand for road salt related to harsh winter conditions during 2000-2001 in Ontario and other parts of North America. Ontario rock salt production in 2001 increased by over 2 million tonnes to a total of 8.6 million tonnes (Table 2).

In November, the Canadian government published a recommendation that road salts, which contain inorganic chloride salts with or without ferrocyanide salts, be added to the Schedule 1 list of toxic substances under the Canadian Environmental Protection Act (CEPA). The action follows the release of a five-year scientific assessment by Environment Canada, which concluded that road salts in sufficient concentrations pose a risk to the aquatic environment, plants and animals. Canadians use millions of tonnes of salt annually to melt the snow and ice from roadways. Under CEPA, the government has 2 years to develop management measures to reduce the impact of road salts on the environment and a further 18 months to implement these measures. A broad range of management actions will be studied, including improved application technologies and better storage and handling techniques.

In the past year, at Goderich and Windsor salt from brine productions remained at or close to plant capacities.

In December 2000, General Chemical Canada Limited announced that its 500 000 tonnes per year synthetic soda ash plant in Amherstburg would be placed on care and maintenance. The plant, one of only two synthetic facilities in North America ceased production in March 2001. The company reconfigured the calcium chloride plant at Amherstburg to run on brine shipped from Manistee, MI rather than a byproduct stream from the soda ash unit. As a result of the soda ash plant shut down, production from the Anderdon Brine Field located just north of the plant was suspended in early 2001. Total 2001 salt production was less than 25 000 tonnes.

Late in 2001, IMC Global Inc of Lake Forest, IL completed the sale of its salt operations and the evaporation and chemical facilities at Ogden, Utah to Compass Minerals Group Inc, an affiliate of Apollo Management LP of New York, NY for approximately US\$640 million. IMC Salt was the world's third largest salt producer, with 14 facilities producing rock, solar and evaporated salt. In 2000, the company's total global production capacity was over 15 million tonnes per annum (M tpa). The company's operating mines in Canada and USA include the world's largest salt mine at Goderich, ON. In North America, Compass Minerals will have 3 operating subsidiaries, including Sifto Canada Inc. Sifto Canada Inc. will operate the salt production facilities at Goderich, ON, Amherst, NS and Unity, SK. It is anticipated that the sale of Sifto Canada Inc. will not have much impact on the operations of the Goderich Mine.

GYPSUM

In 2001, gypsum was mined at 2 locations in Ontario; at Caledonia by Georgia-Pacific Canada Inc. and at Hagersville by CGC Inc. Both operations have on-site wallboard manufacturing facilities. BPB Westroc Inc. operates a wallboard facility in Mississauga, Ontario using flue gas desulphurization gypsum supplied by Ontario Power Generation and other sources. All gypsum mines and wallboard manufacturing operations are within the Southwest Ontario District (Figure 1).

Total gypsum extraction in 2001 was 972 240 tonnes, a reduction of 1.5% from 2000 (Table 2). In Canada, particularly in southern Ontario, the demand for wallboard remains strong.

In the United States there has been reduced consumer demand. Ten newly built wallboard plants with superior production economics, many of which utilize low cost synthetic gypsum produced by power plant flue gas scrubbing processes, have led to over capacity in North America. Closures of older plants are occurring. The reduced demand and over supply have resulted in the lowest wallboard prices in nearly a decade. Ontario exports of wallboard to the United States market have decreased significantly.

CEMENT

Five cement plants, 3 limestone quarries and 1 shale quarry are located in the Southwest Ontario District. St Marys Cement Inc. operates limestone quarry and cement plant complexes at Bowmanville and St. Marys. Lafarge Canada Inc. operates a limestone quarry and cement plant near Woodstock. Along the Lake Ontario shoreline immediately west of Toronto is the St. Lawrence Cement Inc.'s Mississauga cement plant and adjacent shale quarry. Limestone is shipped to this plant from the Ogden Point limestone quarry in south central Ontario. Federal White Cement Ltd. operates a specialized product cement plant near Woodstock; the limestone raw material is purchased from a local quarry.

Cement production levels remained high in 2001 due to the continuing robust demand in the southern Ontario and US Great Lakes markets. Heavy spending on highways, airports, water and other infrastructure projects is creating strong and sustained demand for cement. Companies report that cement sales volumes and prices continue to be strong.

Total cement production from Southwest Ontario District plants is estimated at over 4 million tonnes in 2001.

In early 2001, Lafarge SA purchased the remaining 75% of Blue Circle Industries PLC that it did not already own for US\$6.2 billion. The deal created the world's largest cement producer with a global capacity of 150 M tpa. Regulatory approval of the purchase required that Lafarge must dispose of some of Blue Circle assets, principally 2 cement plants in Ontario, as the takeover would give the French firm 60% control of Ontario's cement market.

In June 2001, the Canada and US regulatory approval was satisfied when 2 Ontario cement plants and other Great Lakes area assets were sold by Lafarge to Votorantim of Brazil for a total amount of Euro 825 million. Based in Sao Paulo, Votorantim is the market leader in Brazil for cement and one of the ten largest cement producers in the world. It operates 16 cement plants with an annual global production capacity of 25 M tpa.

After the sale, Lafarge owns or manages more than 10.9 million tonnes of annual cement production capacity in the US, making it the leading cement producer in North American with a total production capacity that exceeds 18.1 million tonnes.

Votorantim is operating the cement assets formerly owned by Blue Circle under the name of St. Marys Cement Inc., the original name of the cement company that was purchased by Blue Circle in 1997.

In May 2001, the large global cement and building materials producer Holderbank Financiere Glaris Ltd. was renamed Holcim Ltd. Holcim owns 64% of St. Lawrence Cement Group. In Ontario, St. Lawrence Cement operates Canada's largest cement plant at Mississauga. St. Lawrence supplies 40% of the Ontario cement market.

CLAY/SHALE PRODUCTS

In 2001, four companies extracted shale at 7 quarries in southwest Ontario for heavy clay products. The shale supplied 8 brick and tile manufacturing operations within the District. In 2001, approximately 1.25 M tonnes of shale was extracted to produce 635 million standard brick equivalent units at plants within the Southwest Ontario District.

SOUTHWEST ONTARIO DISTRICT – 2001

This is an increase in brick production of approximately 18% over the previous year. Southwest Ontario contributes 95% of Ontario's brick production.

The increased production and new investments in manufacturing capacity reflect the strong demand for brick led by a strong economy and a robust residential construction market in southern Ontario. In 2000, a record-breaking 41 200 new homes were constructed and sold in the Greater Toronto area, most of which contained brick facings or were constructed from brick. An even greater number of new homes were sold in 2001 and the demand for brick has never been higher.

Two large operators, Canada Brick and Brampton Brick, have both quarrying and manufacturing facilities. One smaller operator, Century Brick, also has both quarrying and manufacturing facilities. These 3 companies extract Queenston shale in the area between north Brampton and Hamilton. A small quarry operated by George Coultis & Son Ltd. near Thedford, Ontario, supplied shale to Paisley Brick and Tile Co. and Norwich Brick and Tile. Arkona Formation shale forms the resource rock at the Thedford Quarry.

The Aldershot Brick Plant and Quarry, Canada Brick's new state-of-the-art brick manufacturing plant produced its first bricks on June 25th, 2001. By the end of 2001, the plant was operating at 93% of its 150 million bricks per year design capacity. The \$50 million plant was built in Aldershot, a suburb of Burlington, to accommodate the growing market of southern Ontario. The 23 225 square metres manufacturing facility is supplied by high purity material from a long-term resource of Queenston Formation shale quarried immediately behind the plant. In a process unique to the industry, eight large industrial robots are used to load newly made bricks into two 150m long dryers. The bricks are then transferred to kilns that are fired to temperatures ranging from 225°C to in excess of 1000°C, after which they are unloaded robotically and stored for shipment. The use of the robots allows a relatively small workforce of 54 plant employees to concentrate on operating computerized equipment and attending to maintenance duties.

Brampton Brick opened its expanded manufacturing facility on June 27th, 2001. The state-of-the-art plant is now the single largest clay brick producing facility of its kind in North America. The expansion added 11 600 square metres to the existing facilities, bringing the total operational area to almost 37 100 square metres. With the added facilities, production has increased by almost 50%. The new plant utilizes leading-edge robotic technology with equipment supplied by Ceric S.A. of France. Other new machinery includes a complete new production line comprising 2 brick making machines, robotically controlled setting, 3 dryers, a steel encased tunnel kiln, and packaging equipment. At a cost of \$35 million, the expansion brings plant capacity to 200 million bricks per year.

Canada Brick permanently closed its Streetsville Brick Plant and Quarry on December 14th, 2001. The plant was a major producer of bricks since 1956. The 3 main reasons for its closure were 1) near depletion of its shale resource, 2) ageing plant infrastructure, and 3) increasing land values. Urban development of Mississauga had completely surrounded the site with residential housing occurring within 75m of the quarry face.

CHEMICAL, METALLURGICAL AND FILLER LIMESTONE AND DOLOSTONE PRODUCTS

Except for a small amount of production in northern Ontario that utilizes imported materials, Ontario's lime industry is situated in the Southwest Ontario District. Within the District in 2001, 4 quarrying operations extracted limestone or dolostone for use in the lime, chemical, metallurgical and filler products industries. Some of these and other quarrying operations also sell material for aglime, aggregate, landscaping and engineering uses. Beachville Lime Ltd., located between Woodstock and Ingersoll, produces high-calcium lime from the Devonian Lucas Formation. Dundas Lime Ltd. produces dolomitic lime from the Silurian Gulf Formation purchased from the adjacent Dundas Quarry of Lafarge Canada Inc. E. C. King Contracting extracts glass-grade dolomitic lime from the Silurian Amabel Formation at the Sydenham Quarry near Owen Sound. Guelph Lime Ltd., an affiliate of Beachville Lime Ltd., had been extracting and trucking dolomite to Beachville for processing prior to the suspension of operations at the Guelph Quarry in June 2001. Lime and dolime production has been reduced within the past year due to less demand for product from the steel making industry.

In October 2001, the author led a field trip to the Dundas Quarry of Lafarge Canada Inc. and the adjacent dolomite plant of Dundas Lime Ltd. The following is an excerpt from the field trip guidebook.

Lafarge Canada Inc., Dundas Quarry and Stone Plant

Introduction and history

The history of the quarry begins in 1912 when Canada Crushed Stone Corporation was formed. The main purpose of the quarry was to supply raw dolomite to the local steel and dolime plants. In 1951, Steetley purchased the company. Redland PLC acquired the worldwide operations of Steetley in 1992. Again on a takeover, in 1998 the operations came under the Lafarge Canada Inc. banner.

The current operations produced approximately 4.5 M tonnes of finished product in 2001. *Aggregates and Roadbuilding* magazine reported the Dundas Quarry produced 4.76 M tonnes in 2000, making it the third largest crushed stone quarry in Canada. The dolostone is now used for steel, dolime, concrete, asphalt, glass and construction. Stone production is currently running at 90 hours per week. Shipping operates from 6 a.m. to 6 p.m., 5 ½ days per week.

The quarry and stone plant are located on a 465 ha site, on the Niagara escarpment, just north of Dundas, Ontario. The southernmost operations are approximately 1.5 km from the brow of the Escarpment.

Quarries

Since 1982, all quarrying has been carried out at the 232 Ha North Quarry site. Quarrying occurs in 2 benches. The top bench is for metallurgical products used in the dolime, steel and glass industries. The second bench is for concrete, asphalt and construction markets. In the future a third bench will be developed to provide granular products for the construction market.

The South Quarry was opened in 1963, but is now dormant. The reserve left in this quarry is under 15 m of overburden of silty till and lacustrine fine sands. In 1996, reserves on the property were estimated to be 150 M tonnes.

Geology

The generalized bedrock geology of the property, now exposed in the North Quarry, consists of 3 units. The top bench, approximately 15 m in height, consists of 7 m of Guelph Formation dolostone overlying 8 m of the upper part of the Eramosa Member of the Lockport Formation dolostone. The Guelph Formation is a light grey, very fine-crystalline, medium-bedded dolostone. The upper part of the Eramosa Member is a medium to light brown, very fine-crystalline, medium to thickly bedded dolostone with some black shaly partings. This top bench has been reported to have less than 0.5% silica and less than 0.5% alumina plus iron oxide, and is a high purity dolostone.

The second bench is approximately 13 m in height and consists entirely of Eramosa Member of the Lockport Formation. This rock is a medium to dark brown or black, finely crystalline, thinly bedded dolostone. Laminations and petroliferous bands are common. Vugs occur in the lower part of the bench and some may be filled with gypsum, calcite or chert. There is a higher concentration of silica and alumina in the Eramosa Member rock of this bench, evident in the visible increase in chert and shaly material.

The Dundas Quarry is a noted site for a variety of mineral and fossil specimens. The minerals occur as small or "micro" crystals in a variety of forms lining cavities. Minerals found include celestite, fluorite, calcite, dolomite, gypsum, quartz, strontianite, aragonite, pyrite, marcasite, galena, sphalerite, chalcophyrite, and pyrrhotite. The fossils include crinoids, corals, bryozoa, brachiopods, gastropods and trilobites. Also found are chert nodules and lenses, and black lustrous hydrocarbons which occurs as small nodules and irregular patches.

Within the last 2 years, spectacular specimens have been recovered from the Dundas Quarry by Tim Elliott, including 125 kg orange-yellow calcite clusters and 9 cm across yellow fluorite crystals. The massive calcite specimens were found in a vein/fissure 76 cm across and 6 m high.

Drilling and blasting

Drilling is performed by one employee, operating an Ingersoll Rand DM25SP. This is a single pass drill that requires no drill steel changes for each hole. Two drill hole sizes are used, 5 ½ inch and 4 ½ inch. The drill patterns are 14 by 16 foot and 16 by 18 foot single and double row. A contractor performs blasting five days a week using AN/FO and wet emulsions for wet holes. As an environmental precaution, seismographic equipment is used to monitor each blast.

Rock handling

Following each blast, shot rock is classified by size. Those segments exceeding one tonne, called armour stone, are held aside for landscaping or engineering uses. The primary loading fleet consists of a CAT 990 II and a 992G, with bucket capacities of 9.2 m³ and 12.3 m³ respectively. The primary haul fleet consists of CAT 777D haul trucks, each with payload capacity of 60.1 m³.

The primary crusher, located in the North Quarry, is an Allis Chalmers 54/74 Gyratory set at 152 mm. The crusher's close proximity to the quarry face eliminates long hauling, thereby reducing dust and noise while achieving greater efficiency and lower operating costs. The primary crusher reduces up to 1650 tonnes of stone per hour to - 20 cm. Stone moves from the stacker conveyor to a surge pile and from there through vibrating feeders onto a covered belt.

The primary crushed stone is transferred to the processing area on a 3.2 km long cable belt that proceeds through a tunnel under Highway 5. The 1.066 m wide cable belt conveyor moves 1500 tonnes per hour of -152 mm stone. Powered by two 350 hp electric motors, the silent-running belt has a 5 km radius curve making it the longest curved cable conveyor in North America and the only known one of its type in the aggregates industry worldwide. The belt runs flat and is carried on 2 specially designed 35 mm diameter steel cables instead of standard troughing idlers. To reduce noise, the entire length of the cable conveyor has been covered with a baffle. As an additional noise prevention measure, the grooves in the steel pulleys carrying the cables have been lined with polyurethane.

Stone processing plant

The processing area is located on 67 Ha south of Highway 5. This area was quarried between 1934 and 1974, but is no longer licensed for extraction. Buildings on this site include a scale house, administration office, maintenance garage, quality assurance laboratory and processing plants. The area is used for stone processing, stockpiling and shipping.

The secondary plant consists of 4 crushers, Nordberg 7 foot standard cone, Pennsylvania 1550 hammer mill and two Canica 125 vertical shaft impactors. The plant incorporates 8 triple deck screens. The secondary plant produces granular, 50 mm and 26.5 mm kiln feed, 19 mm clear, screenings and a -19 mm wash plant feed.

The wash plant consists of 4 triple deck screens, 11 by 40 foot Eagle Iron Works classifying tank, and 66 inch and 36 inch dewatering screws. The plant produces 19 mm concrete stone, 19 mm asphalt stone, HL 3, 6.7 mm chip and high stability sand.

The dried fines/pulverizing plant produces dried dolomitic sand for the glass industry and fine crushed dolostone aggregate for agriculture, automotive sound deadening and various filler applications. The plant uses a 30 foot rotary drier, two 6 by 14 foot double deck screens, 2 cage mill crushers and 2 dust collectors.

Shipping of products from the site occurs 24 hours a day, 7 days per week. A quality control laboratory to provide customers with a consistent supply monitors all products.

Products

The plants produce over 50 products, including the following, generally listed from largest to smallest. Currently, metallurgical grade dolostone represents approximately 25% of production and the wide variety of other products account for approximately 75% of production.

- Armour stone - 3 to 9 tonne dolostone blocks used for shoreline protection and other engineering purposes.
- Rip rap - random dolostone pieces, generally sized between 25 to 75 cm, for shoreline, erosion control, engineering and landscaping uses.
- Gabon stone - random dolostone pieces, generally sized between 10 to 20 cm, placed in wire cages for shoreline, erosion control, engineering uses.
- Metallurgical grade dolostone - 50 mm and 26.5 mm stone used for blast furnace flux, as well as kiln feed to produce a range of dolomitic lime products for use in the steel and glass industries.
- Concrete, asphalt and other aggregates - including 19 mm concrete stone, 19 mm asphalt stone, HL 3 (13.2 mm asphalt stone), 6.7 mm chip and high stability sand.
- Fine sand - -1.6 mm +75 microns used in the glass industry.
- Fillers - < 75 microns for roofing shingles and sound deadeners.

Dundas Lime Limited, Dundas Plant

The Company

Dundas Lime Limited is part of the Carmeuse North America Group. In 1998, all operations on the Dundas Quarry site came under the Lafarge Canada Inc. banner, and the lime plant operated under the name of Lafarge Lime. In 1999, there was a consolidation of Ontario's 4 largest lime/dolime operations into the Carmeuse North America Group joint venture. Carmeuse brought BeachvilLime, Guelph DoLime, and Global Stone Ingersoll, and Lafarge brought Dundas Lime to the joint venture. Carmeuse operates Carmeuse NA Group.

Processing

Dundas Lime, located immediately east of the stone plant, processes feed stone through 3 rotary kilns to produce dolomitic lime, lime and deadburned dolomite for the steel, fiberglass, and refractory industries. Total production capacity from the 3 kilns is 350 000 tonnes per year requiring approximately twice as much feed. Two sizes of stone are used as feed: -2 ½ inch to +1½ inch (-63 mm to +37.5 mm) and -1½ inch to + ¾ inch (-37.5 mm to +19 mm).

All kilns are direct-fired and are capable of burning coke blended with coal, fluid coke, oil or natural gas fuels up to 2000°C. Except for maintenance downtime the kilns operate continuously, 365 days per year.

Kiln 1 is a 106.4 m long F.L. Smidth kiln with a diameter of 2.7 m at the feed end and 3 m at the firing end. The clinker discharges to a Niems cooler. The Kiln is fired by solid or oil fuels only.

Kiln 2 is a 91.4 m long F.L. Smidth kiln of 3 m diameter for the full length, the clinker discharging to a Fuller grate cooler. It is fired by solid, liquid or gaseous fuels.

Kiln 3 is a 117.3 m long Fuller kiln of 3.5 m diameter for the full length, the clinker discharges to a Niems cooler. It is fired by solid, liquid or gaseous fuels.

Electrostatic precipitators on the kilns collect dust particulate from exhaust gases before they are released into the environment. Other ancillary dust collectors, such as baghouses, are located throughout the system.

Following burning, the clinker may be crushed and/or screened depending on the customer's specifications. Product storage totals approximately 7 000 tonnes.

Products

The major kiln product is Dolime, a calcined dolomite. Calcining is the process of heating to high temperatures to drive off carbon dioxide. The larger feed material is used for manufacturing Dolime (soft burned dolomite) at a kiln temperature of 1538°C. Dolime is used by the steel companies for slag conditioning in Basic Oxygen Furnaces, and when in contact with molten steel the Dolime goes into solution, tying up the silica, which would destroy the furnace lining, and the sulphur which, if not removed, would result in a low quality steel.

SOUTHWEST ONTARIO DISTRICT - 2001

Dolopel, a refractory product, is a double burned, special hard, high-purity dolomite grain used for making dolomitic resin-bonded and fired refractory bricks. It is produced by further high temperature processing of dolomitic lime.

The smaller feed stone is used to manufacture Dolomax (deadburned dolomite) at kiln temperatures of 1649°C to 1760°C. Dolomax is coated with iron oxide (mill scale) and used to fettle or condition Electric Arc Furnaces. Currently, there is limited production of Dolomax.

Two additional products can be manufactured if there is capacity or markets. High calcium lime, manufactured by using limestone from Oxford County, is sold to steelmakers as a fluxing agent. Ferrodolime, a special form of Dolime coated with iron oxide while in the kiln, is used as a slag conditioner in the Basic Oxygen Furnaces and Electric Arc Furnaces to extend refractory life. The iron oxide coating creates a dust-free product that goes into solution more readily.

DIMENSION/BUILDING STONE

In 2001, twenty-two quarries in the Southwest Ontario District extracted material for dimension, building and landscape stone uses. A limited number of these quarries also extracted stone that was crushed and used as aggregate. Two new quarries were developed in 2001, the Arnold property Quarry of Ebel Quarries Inc. and the Ross property Quarry of Bruce Peninsula Stone Ltd. Both of these operations, located immediately west of Wiarton, have started extracting Eramosa dolostone.

Most stone quarry operators indicated that the demand for stone outstripped supply in 2001; particularly those supplying Eramosa Dolostone/Marble and Whirlpool Sandstone as landscape materials. Many of these operators reported 2001 as "a good year" or "the best year", with most indicating a strong market which will probably continue into 2002. The Whirlpool Sandstone producers report that by January 2002 all production for the coming year has been sold out. The primary market for stone is southern Ontario - from Oshawa to Windsor, the secondary market is the Great Lakes region of Canada and the US, with a limited amount being shipped farther afield.

The largest concentration of stone producers in the Southwest Ontario District is in the Wiarton area where 12 operations extracted Eramosa Member dolostone for building stone, landscaping and flagstone markets. Owen Sound Ledgerock Ltd., the largest stone quarrying and processing operation in the District, cut and polished Eramosa material for dimension and building stone uses utilizing over 70 large format stone cutting machines. Owen Sound Ledgerock Ltd. also processed stone shipped from Manitoulin Island, eastern Ontario and Indiana. Ebel Quarries Inc. extracted Eramosa quarry blocks, in addition to Eramosa for building and landscape stone products. All other Eramosa producers supplied building and landscape stone products.

Bruce Peninsula Stone Ltd. at the Lindsay Quarry on the northern portion of the Bruce Peninsula extracted Guelph Formation dolostone for supplying building and landscape stone products.

Arriscraft International Inc. operated the Adair Marble Quarry just north of Wiarton. Blocks of the Wiarton/Colpoy Bay Member of the Amabel Formation are extracted and either processed on-site or transported to the company's Cambridge plant.

In the Georgetown-Inglewood area, white and maroon Whirlpool Formation sandstone was extracted at the Rice & McHarg, Hilltop Stone and Supply, and Deforest Brothers quarries for the production of squared and irregularly shaped landscaping stone.

In the Orillia area, Gull River Formation limestone was extracted by three separate companies; Speiran Quarries Ltd., Cut Above Natural Stone, and Stone Cottage Inn Ltd. for sale as building and landscape stone. Also in the Orillia area at the Rama Stone Quarries Ltd. property, gneiss was quarried for landscape stone and crushed for premium-quality aggregate.

ADVANCED EXPLORATION AND DEVELOPMENT

Dimension/Landscape Stone

In addition to the continued development of the new Arnold property Quarry of Ebel Quarries Inc. and the Ross property Quarry of Bruce Peninsula Stone Ltd., several dimension/building stone projects have started the licensing process under the Aggregate Resources Act. For reasons of legal privacy and confidentiality, the companies and individuals working on these projects and their exact locations cannot be identified. The projects include a limestone quarry in Rama Township, 3 applications for new licenses to quarry Eramosa dolostone/marble in Keppel, Albemarle and Amabel townships, and 3 dolostone quarry projects in Lindsay, Albemarle and Amabel townships. These applications and projects are at varying stages within the process. It is anticipated that at least 2 of these projects will be in production in 2002.

Greenock High-Calcium Limestone Quarry

Formosa Environmental Aggregates Ltd. owns approximately 120 ha in the municipality of Brockton in southern Bruce County. The property hosts a resource of approximately 15 million tonnes of high-calcium limestone grading 99% calcium carbonate. In 2001, the company continued the permitting process to quarry products for chemical, agricultural, environmental, and construction uses. The property is zoned for mineral extraction under the local and county land use plans.

An Ontario Municipal Board decision in late 2000 indicated that once Department of Fisheries and Oceans (DFO) concerns with respect to the creek crossing the property have been resolved, licensing should proceed. In 2001, it was determined that the west portion of the property does not need DFO approval due to its distance from the creek. In 2002, final documents will be filed with the Ministry of Natural Resources for a license under the Aggregate Resources Act to cover the west portion of the property. Formosa Environmental Aggregates Ltd. will submit additional work to satisfy DFO concerns on the east portion.

EXPLORATION ACTIVITY

All exploration activity in the Southwest Ontario District occurs on private land and there is no requirement for companies or individuals conducting mineral exploration to file assessment reports with the Ministry of Northern Development and Mines or to contact the Southwest Ontario District Geologist's Office. Through informal discussions however, staff of the Southwest Ontario District Geologist Office are kept apprised of most exploration or property acquisition interests for such commodities as: high-purity limestone/dolostone, salt, gypsum, sandstone, limestone/dolostone/marble, dimension/building stone, cement, and shale. Numerous companies and individuals contacted the Southwest Ontario District Geologist Office throughout 2001 for information and/or advice with respect to exploration areas, commodities, exploration methods, processes for acquiring mineral properties and exploration opportunities. Confidentiality and private land issues surrounding the competitive and market-driven nature of the industrial minerals industry impedes disclosing the identities of companies and/or individuals exploring in southwest Ontario and/or the locations of their properties. However, most exploration centres on the commodities that are currently experiencing strong market conditions, including aggregate, dimension/building stone and shale/brick.

RESIDENT GEOLOGIST STAFF AND ACTIVITIES

The Southwest Ontario District Geologist Office, staffed by the District Geologist and the District Support Geologist, operates from the Mines and Minerals Information Centre (MMIC) in Toronto. All files, mineral deposit records and reference materials for Southwest Ontario District are available for viewing at MMIC. In 2001, the

District Geologist was Ken Steele. The District Support Geologist position was vacant during January and February. Lindsay Hall started as the District Support Geologist on February 27th. Lindsay was on leave for much of March and on June 15th, she left the Resident Geologist Program to take a temporary mapping position with the Ontario Geological Survey - Precambrian Geoscience Section. The District Support Geologist position remained vacant until late August, when Max Barua took on the assignment of acting District Support Geologist.

In 2001, staff continued updating mineral deposit inventory (MDI) files for the Southwest Ontario District. By year-end, approximately 35 files that represent the gypsum commodity MDI files for the Southwest Ontario District had been updated.

Throughout 2001, Southwest Ontario District staff assisted approximately 1150 clients who visited or contacted the District office, plus an additional approximately 1100 clients at venues away from the office. Staff responded to a wide variety of inquiries, the most frequent requests for information focused on the following southern Ontario commodities and topics: limestone, dolostone, lime, calcium carbonate (PCC and GCC), shale, clay, salt, gypsum, building/dimension stone, aggregate (crushed stone, and sand and gravel), silica, mica, zinc, diamonds, Oak Ridges Moraine, Niagara Escarpment, Aggregate Resources Act, groundwater, mineral ownership and rights, mineral and fossil collecting sites, teacher and student requests, property evaluations, aggregate industry economics and building stone quarrying technologies.

Property Examinations/Company Contacts

In 2001, the focus of site visits in Southwest Ontario District was four-fold: 1) to continue to increase familiarity with all mineral industry operations within the District by focusing on their resources, operations and issues; 2) to visit prospective, proposed or developing mineral properties; 3) to investigate mineral sites with current or potential land-use conflicts; and 4) to acquire information for subsequent field trip visits.

There are 44 industrial mineral operations and approximately 40 aggregate quarries active in southwest Ontario. During 2001, the District Geologist made contact with almost all industrial mineral producers. The District Geologist and/or District Support Geologist visited 35 mineral extraction or processing sites (see Table 3). Site visits included investigations at 20 quarries, tours of 14 industrial mineral processing plants, and a reconnaissance stop at a prospect for shale. Site visits provided information on commodities, mineral deposits, local and regional geology, extraction techniques, processing, products, markets, production and economic statistics, and issues.

The District Geologist was provided comprehensive geology and/or plant processing tours at:

- Lafarge Canada – Dundas Quarry
- Dufferin Aggregates – Milton Quarry
- E.C. King Contracting – Sydenham Quarry and Owen Sound Dolomite Plant
- Owen Sound Ledgerock – Owen Sound Plant
- Arriscraft International – Adair Marble Quarry
- PPG Canada – Owen Sound Glass Plant
- Dundas Lime – Dundas Plant
- Dofasco – Hamilton steelmaking operations
- Lafarge Canada – Mosport Pit
- St. Lawrence Cement – Ogden Point Quarry
- OMYA (Canada) – Perth calcium carbonate processing plant

Mine, quarry, property and site visits are all part of the Resident Geologist Program's on-going responsibilities to monitor current mineral activities, to document known mineral deposits and occurrences, and to identify areas of high mineral potential. Site visits also provide useful information for application to land use planning processes.

Field Trips and Publications

The District Geologist organized and led 3 field trips in 2001.

The District Geologist co-organized and co-led the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) Toronto Branch field trip on June 25th entitled "4M – Milling, Moraine, Metallurgical/mineralogical, Mining". Approximately 40 people participated in the day-long trip. The District Geologist produced a 21-page guidebook.

The trip headed east from Toronto and stopped at:

- 1) P.R. Engineering in Oshawa. P.R. manufactures, repairs and refurbishes crushers and milling equipment for the mining and aggregates industry.
- 2) Lafarge/TRT Mosport Pit. This operation on the Oak Ridges Moraine is Ontario's largest sand and gravel pit and Canada's second largest, producing over 2 M tpa.
- 3) Lakefield Research. A tour of Lakefield's metallurgical, analytical, mineralogical and environmental services and expertise. A diamond processing plant was of interest to many.
- 4) St. Lawrence Cement's Ogden Point Quarry. This mining operation extracts 2 M tpa to supply cement rock via shipping on the Great Lakes to the company's Mississauga cement plant.

The trip was sponsored by AMEC; Borland, Levand & Associates; Barrick Gold Corporation, Goldcorp Inc.; Lakefield Research Limited; MNDM; P.R. Engineering Limited; Smith Lyons; and Watts, Griffis and McQuat Limited.

On October 15th, the District Geologist organized, wrote the field guidebook and led the "Stone to Steel" field trip. The trip was a partnership of MNDM, CIM Toronto Branch and CIM Industrial Minerals Division. Throughout the day, the trip followed the use of dolomite and dolime from the quarry face through the steel making process. The trip visited:

- 1) Lafarge Canada Inc. Dundas Quarry and Stone Plant. *Aggregates & Roadbuilding* magazine reported the Dundas Quarry produced 4.76 M tonnes in 2000, making it the third largest crushed stone quarry in Canada. The dolostone is used for steel, dolime, concrete, asphalt, glass and construction.
- 2) Dundas Lime Limited, Dundas Plant. The plant, located immediately east of the stone plant, processes feed stone through 3 rotary kilns to produce dolomitic lime, lime and deadburned dolomite for the steel, fiberglass, and refractory industries. Total production capacity from the 3 kilns is 350 000 tonnes per year requiring approximately twice as much feed.
- 3) Dofasco Hamilton steelmaking operations. Dofasco, one of Canada's largest steel producers, utilizes both oxygen steelmaking and scrap-based electric arc furnace technology and produces flat rolled and tubular steels. Dofasco shipped over 4 M tonnes of steel from Hamilton in 2000.

The trip had 40 participants, mostly from CIM Toronto Branch, CIM Industrial Minerals Division, and attendees of the Industrial Minerals 2001 Conference. In addition to the above noted organizations, the trip had attendees from Aggregate Producers Association of Ontario, the Prospectors and Developers Association of Canada, Natural Resources Canada, MNDM and *Industrial Minerals* Magazine. The success of the trip resulted from the partnership of organizers (MNDM, CIM Toronto Branch and CIM Industrial Minerals Division), sponsors (Beachville Lime Limited, Barrick Gold Corporation, Lafarge Canada Inc., and Northway-Photomap Inc.) and hosts (Lafarge Canada Inc., Dundas Lime Limited and Dofasco Inc.).

On October 25th, the District Geologist led a field trip on the "Geology and Stone Industry of the Bruce Peninsula". The trip was attended by senior students from Bruce Peninsula District Secondary School and staff of the Bluewater District School Board. The daylong trip included a lecture on the formation, rocks and land use issues of the Niagara Escarpment, and six field trip stops. Field trip stops included 2 building stone quarries - Owen Sound Ledgerock Ltd. Warton Quarry and Arriscraft International Adair Marble Quarry.

The District Geologist was directly involved in a number of publications released in 2001.

SOUTHWEST ONTARIO DISTRICT – 2001

The District Geologist, in co-operation with MNDM Tweed office staff, produced an updated brochure "Ontario Industrial Minerals – Production, Development & Exploration Projects, Opportunities". The 8-page brochure provides an overview of industrial minerals in Ontario.

The District Geologist wrote an "Ontario Industrial Minerals" article for the Ontario Exploration supplement to the November 2001 *Mining Journal*.

The paper "Ontario's industrial mineral industry: an overview" (M. Gerow, P. Sangster and K. Steele, pp. 133-135 in *Industrial Minerals in Canada, CIM Special Volume 53*) was published in 2001.

Conferences and Meetings

District staff participated in a number of conferences, trade shows and meetings in 2001.

In March, the District Geologist attended the Prospectors and Developers Association of Canada convention.

In April, the District Geologist and District Support Geologist attended the Northeast Ontario Minerals Symposium in Sudbury. A southern Ontario Resident Geologist Program display highlighted exploration opportunities.

In May, the District Geologist attended the 37th Forum on the Geology of Industrial Minerals in Victoria, BC. Participation included:

- 1) Creating, shipping and staffing (in partnership with the Southern Ontario Regional Resident Geologist) an "Ontario Industrial Minerals – Production, Development & Exploration Projects, Opportunities" display. An Ontario brochure was distributed that included brief descriptions of industrial mineral production, exploration and development projects, exploration opportunities, and tables of industrial mineral production and exploration projects. The display was well received, with many delegates getting their first exposure to Ontario's economy, geology, industrial mineral commodities, producers, and markets.
- 2) Attending technical sessions; more than 300 delegates attended the conference. The delegates represented a mix that included government geologists, academics, geologists/managers from industrial mineral companies, private geologists/consultants, geologists/staff of exploration companies, and sales staff of minerals industry suppliers. Representation was from around the world, with approximately one-half from the USA and one-quarter from Canada. Technical sessions focused on aggregates and transportation, value-added industrial minerals, diamonds in Canada, dimension stone, magnesite-magnesia-magnesium metal, and exploration for and evaluation of industrial mineral deposits.
- 3) Joining 2 field trips, "Industrial Minerals – Cordilleran Transect: Calgary, Alberta to Victoria, BC" and "Geology and Aggregate Production of the Colwood Delta – Construction Aggregates Producers Pit".
- 4) Participating in 10th Federal/Provincial Meeting on Industrial Minerals

In June, the District Geologist and District Support Geologist attended and assisted with Qmap – Quaternary Geology of Southern Ontario stakeholders meeting. The Qmap project will create a seamless digital Quaternary geology map of southern Ontario.

In October, MNDM exhibited "Ontario Industrial Minerals – Production, Development & Exploration Projects, Opportunities" at Industrial Minerals 2001 – the 13th Annual Conference on Markets for Industrial Minerals in Toronto. Staff of the Southwest Ontario District Office led the organization of this exhibit. A feature part of the display was the new exhibit of 40 Ontario industrial mineral rock and mineral samples. The samples include all industrial mineral commodities currently in production and those with real opportunities for development in the future. Samples were collected from producers and Ministry offices in Toronto, Tweed and Sudbury. Owen Sound Ledgerrock Ltd. donated a polished stone sign "Ontario Industrial Minerals". The display was popular and the rock and mineral samples prompted much discussion concerning Ontario's producers, deposits, geology, exploration projects and potential.

The District Geologist attended Industrial Minerals 2001. It is the premier annual industrial minerals meeting in Canada that highlights emerging and important commodities and markets. In 2001, three presentations directly focused on Ontario's producers or geology:

- 1) "Opportunities for Ontario Muscovite – Geology, Processing and Markets" by Don Hains, Chris Marmont and Tassos Grammatikopoulos, a study funded by MNMD
- 2) "Calcium Carbonate from Landscaping product to High Added-Value product for Finished Goods Manufacturing" by Olivier Chatillon, OMYA Canada Inc.
- 3) "An Overview of Lafarge's Dundas, Ontario Dolomite Quarry" by David Kelday, Lafarge Construction Materials

In November, The District Geologist participated in an MNMD exhibit entitled "Ontario Canada" at StonExpo in Fort Lauderdale, Florida. StonExpo is the largest dimension stone trade show held annually in North America. Over the past few years, attendance at StonExpo has been in the order of 4500 attendees, with over 200 exhibitors. Attendees and exhibitors represent all sectors of the stone industry including stone producers, processors, equipment and service companies.

The Ontario booth was a partnership of 7 Ontario stone producers and the MNMD. The industry partners were:

- 1) Architectural Stone Corp., Sudbury
- 2) Arriscraft International Inc., Cambridge and Hope Bay
- 3) McLaren's Bay Mica Stone Quarries, Redbridge
- 4) Muskoka Rocks, Port Carling
- 5) Owen Sound Ledgerock Ltd., Owen Sound and Wiarton
- 6) StoneAge Lighting, Dundas
- 7) Upper Canada Stone Ltd., Madoc and Mississauga

Individual companies displayed their own samples, brochures, posters and portfolios. MNMD presented approximately 40 stone samples representing most current Ontario producers and a number of development or investment opportunities. The Ontario booth was one of the busiest exhibits at the show.

In December, the District Geologist presented the following at the Ontario Exploration and Geoscience Symposium held in Toronto:

- 1) Oral presentation "Mining in Southern Ontario, A Billion Dollar Business –2001" with co-author Pam Sangster, Southern Ontario Regional Resident Geologist. The presentation highlighted the \$1.9 billion value of mineral production from southern Ontario. The region hosts over 75 non-aggregate mineral extraction operations – 5 of which are underground mines and the remainder are open pit mines and quarries. On-going mineral development projects, exploration programs for a wide variety of commodities including mica, vermiculite, graphite, diamonds, limestone, dimension stone, wollastonite and shale, and exploration and development opportunities were presented.
- 2) Booth presentation of "Ontario Industrial Minerals – Production, Development & Exploration Projects, Opportunities" in co-operation with the Regional Resident Geologist Southern Ontario, and the MNMD Commodities program.
- 3) Poster presentation "Mining in Southern Ontario 2001" in partnership with Tweed Resident Geologist Office. Poster highlighted the 78 current producers and 7 recommendations of exploration.
- 4) PDAC Mining Matters exhibit in co-operation with Ed Freeman and Pat Dillon. The new grade 7 Mining Matters II teaching kit was highlighted.
- 5) Geoscape Toronto poster presentation in co-operation with Ed Freeman. A draft poster was exhibited for comment. The Geoscape Toronto poster, due to be published in spring 2002 for the general public, will present geology and land use issues in the Greater Toronto area.

Land Use Planning

The District Geologist and District Support Geologist were involved in a number of land use planning initiatives that required Ministry input throughout the year.

Continuing through 2001, the District Geologist served as a member of the City of Brampton, Northwest Brampton Urban Boundary Review, Shale Resources Review Steering Committee. The project involves a consultant's study to determine the amount and location of shale resources to be protected for future extraction by the brick industry. The consultant has completed geological and brick industry compilation report and maps, and a shallow drilling program to determine drift thickness. The District Geologist provided input into the planning for the next stage that will focus on a limited deep drilling program to determine shale quality for brick making and groundwater conditions. At a steering committee meeting, the District Geologist presented the newly released OGS OFR 6058 "A regional evaluation of the shale resource potential of the upper Queenston Formation, southern Ontario".

In support of mineral resource issues in land use planning, the District Geologist also reviewed and provided comments on the following:

- Halton Region Official Plan Amendment (Oakville) – shale resources
- Oxford County Official Plan (Drumbo) – gypsum mining and resources
- Brant County Official Plan (Paris) – past gypsum mining operations
- Melancthan Township Official Plan – aggregate resources
- Oil pipeline location study (Paris/Brantford/Caledonia/Hagersville) – active and past gypsum mines

The District Geologist participated in the Ministry of Municipal Affairs and Housing (MMAH) review of the Provincial Policy Statements (PPS) within the Planning Act. As part of the review the following official plans were reviewed with respect to mineral resources: City of Pickering, Town of Ajax, Region of Durham, Town of Clarington, and Township of Tay. The District Geologist attended and acted as a facilitator at a MMAH sponsored PPS Review Workshop in Brampton. The workshop, attended by approximately 40 municipal planners and representatives of planning organizations within the Greater Toronto area provided feedback on how the PPS are working and how they could be improved.

As part of Provincially Significant Mineral Potential (PSMP) methodology development for industrial minerals, the District Geologist provided expertise into the mineral deposit models and scoring criteria, updated criteria scoring templates, attended an industrial minerals meeting in Sudbury, and undertook preliminary testing of criteria on MDI points and geological tracts across southwest Ontario. The District Geologist and District Support Geologist attended PSMP training in Tweed.

Public Education

The Southwest Ontario District is home to approximately 75% of Ontario residents. To service the general interest inquiries from the approximately 8 million District residents, staff of the Southwest Ontario District participates in a limited number of public education projects.

The District Geologist is an active member of the PDAC Education Committee. This group's major project is the PDAC Mining Matters, which involves the creation and construction of teaching kits designed for the grade 4 and 7 levels that illustrate the importance of minerals, rocks, metals and mining in today's society.

In 2001, PDAC Mining Matters teacher staff, volunteers and students redesigned the grade 7 unit into "Mining Matters II – The Earth's Crust", and then assembled 700 kits in both official languages. The new kits deliver 100% of the expectations for the new *Earth's Crust* strand of the *Ontario Curriculum for Science and Technology*. Each kit includes 35 forty-minute lesson plans and activities within a teacher's binder, and resource materials including rock and mineral samples, posters, books, videos and mineral testing equipment. Southwest Ontario District staff co-

ordinated the collection of rock and mineral samples for the kits that comprise 3 samples for each of 26 rock and mineral types. The collection of rock and mineral samples include quartzite, shale, limestone, sandstone, gneiss, salt and dolostone samples donated by Unimin Canada Inc., Canada Brick, Beachville Lime Ltd., Rice and McHarg Quarries, Fowler Construction, The Canadian Salt Company Ltd. and Dufferin Aggregates, respectively. Staff also co-ordinated the donation of samples from the Resident Geologist offices in Tweed, Timmins, Kirkland Lake and Sault Ste. Marie.

The District Geologist and District Support Geologist participated in judging Junior Miner of the Year submissions to PDAC Mining Matters.

The District Geologist is involved in a partnership project entitled Geoscape Toronto that is designed to highlight the interaction of geology, landscape, earth and water resources, and people within the Greater Toronto area. Geoscape Toronto will produce a poster for students, teachers, land-use planners, and the public. The project includes representatives from the OGS, Geological Survey of Canada (GSC), University of Toronto, Royal Ontario Museum, Ministry of Municipal Affairs and Housing, Toronto Region Conservation Authority and the private sector. In spring 2001, the District Support Geologist drafted figures for the poster. In late 2001, a draft poster was exhibited for comments from educators and geologists. The Geoscape Toronto poster will be published through the GSC in 2002.

The District Geologist made a limited number of in school presentations. Two grade 4 classes were provided the opportunity to learn first hand about mineral and rock samples as part of "Minerals in Your Life" presentations. Two grade 7-8 classes experienced the "Geology of Ontario" through rock and mineral samples and a slide presentation.

RECOMMENDATIONS FOR EXPLORATION

In addition to the 4 recommendations for exploration presented below, the recommendations for Access to Great Lakes Markets, Multiple Commodities, and Sylvania Formation Silica Sand, outlined in the *2000 Report of Activities* continue to be valid (Steele 2001). The selection of mineral deposits not being mined in the Southwest Ontario District presented in Table 6 are also exploration and development targets.

Queenston Shale

Market/Use:

The brick industry in Ontario currently extracts almost all of its raw resources from the Queenston Formation shale. As of January 2002, six quarries supply shale for 8 operating brick plants. The \$134 million industry is currently operating at capacity, producing over 700 million brick units per year. The 2 major producers, Canada Brick and Brampton Brick have invested over \$85 million in new manufacturing capacity over the past 2 years.

The Late Ordovician Queenston Formation is a thick sequence of red shale prominently exposed along the base of the Niagara Escarpment. It is a maroon, slightly calcareous to non-calcareous, locally gypsum-bearing shale with interbeds of grey-green shale, limestone and calcareous siltstone. The grey-green beds have a higher lime content. The shale breaks down readily by weathering, leaving a softer residual material that is somewhat leached of lime and exhibits improved ceramic properties.

Area:

The Queenston Formation occupies a narrow, wedge-shaped area located immediately east of the Niagara Escarpment that extends from Owen Sound to the Mississauga and Hamilton areas. It also forms the bedrock of an area bounded by Lake Ontario and the Niagara Escarpment between Hamilton and Niagara Falls. In eastern Ontario, it is found to outcrop in a small area southeast of Ottawa.

To contrast the positive market news, a significant issue for the brick industry is the rapidly shrinking resource area of Queenston shale. The main area of accessible and exploitable Queenston Formation is a narrow, wedge-shaped area located immediately east of the Niagara Escarpment extending from north Brampton to the Oakville and

Hamilton areas. This area has the necessary combination of shale beneath thin overburden that exhibits suitable chemical and physical properties for brick manufacturing. Much of this area has become or is quickly becoming urbanized. The rapid expansions of Oakville, Burlington, Brampton, Georgetown and Milton make the remaining accessible Queenston shale resource highly desirable and valuable.

Due to the rapidly shrinking availability of Queenston Formation shale due to urbanization, in 2000 the OGS initiated a 2-year study to document the geological properties of the Queenston Formation where it is presently quarried and to investigate its resource potential on a regional scale.

References:

Armstrong, 2001a
Armstrong, 2001b
Armstrong and Frederic, 2001

Eramosa Dimension and Landscape Stone

Market/Use:

There is strong demand for Eramosa dolostone/marble for dimension stone, residential decorating and landscaping markets. The Eramosa Member of the Guelph Formation is a thin-bedded dolostone that has been quarried on the Bruce Peninsula since the early 1900's for a variety of building and landscaping stone products. The Eramosa Member of the Guelph Formation is currently extracted from 12 quarries near Wiarton, Ontario. Many of these quarries have operated for decades and now have limited reserves. In order to maintain future supply, new exploration and testing for suitable units of Eramosa is recommended.

Area:

In the late 1980's the OGS completed a mapping project on the stratigraphy and resource potential of the Eramosa Member on the Bruce Peninsula. The report presents a description of the lithology of the Eramosa Member, a discussion of the stratigraphic relationships both within the Member and with respect to its bounding formations, comments on its regional distribution, and aspects of its resource potential as a building stone. As a follow-up project, the OGS did detailed mapping of the Paleozoic geology of the Bruce Peninsula. The areas probably and possibly underlain by Eramosa Member are quite small and potentially quite valuable based on current demand for Eramosa stone products.

References:

Armstrong and Dubord, 1992
Armstrong and Meadows, 1988
Armstrong, 1993a
Armstrong, 1993b

Gull River Limestone Dimension and Landscape Stone

Market/Use:

Currently limestone from the Upper Member of the Gull River Formation is extracted at 3 quarries in Rama Township. Up to 5 additional quarries extract Gull River Formation limestone further east in Ontario. The light grey, medium bedded, lithographic limestone, with small patches of calcite crystals or "birdseye" texture, weathers light grey to white. The stone is used for building and landscaping purposes. The exposed, weathered surface of the limestone is in high demand for landscape projects.

The desirable look of rough and weathered Gull River Formation creates a demand for additional and long-term supply of the stone. New exploration and testing for suitable units of Gull River is recommended.

Area:

In the late 1990's the OGS completed a mapping project on the Paleozoic geology and stratigraphy of the northern Lake Simcoe area. As part of the project, the OGS conducted detailed mapping of the Paleozoic geology of the area from Midland to Bobcaygeon. These references provide an excellent database to explore for Gull River Formation limestone.

References:

Armstrong, 2000
Armstrong and Anastas, 1993
Armstrong and Rheume, 1994
Armstrong and Rheume, 1995

Guelph Formation Dolostone

Market/Use:

The Guelph Formation is well known as a resource for the production of high-purity dolomite and calcined products for use in the steel industry. Additional potential uses of high-purity dolomite include raw materials for the production of magnesium metal, chemicals, plastics, rubber and refractory products. The bank reef complex and inter-reef depositional environments within the Guelph Formation form good targets for very high-purity dolomite deposits. Analyses of Guelph Formation drill core indicate intervals of extremely pure, nearly 100% dolomite (21.8% MgO).

Area:

Areas of potential include the northern Bruce Peninsula, Beachville-Ingersoll, and Owen Sound to Woodstock.

Reference:

Kelly, 1996

OGS ACTIVITIES AND RESEARCH BY OTHERS

Table 4 lists new OGS and Geological Survey of Canada (GSC) publications on southwest Ontario released or received in 2001.

The OGS, Sedimentary Geoscience Section conducted 3 projects within the Southwest Ontario District in 2001. A summary of each project was published in OGS 2001 Summary of Field Work; references to these summaries are included in Table 4.

Derek Armstrong of the OGS Sedimentary Geoscience program continued into a second year a mapping and geochemical sampling project of Upper Ordovician shales - the Blue Mountain, Georgian Bay and Queenston formations. Queenston shale is the primary resource for Ontario's brick industry. Three releases of information and data from the first year of the project were published in 2001 (Armstrong, 2001a; Armstrong, 2001b; Armstrong and Frederic, 2001). These data are in high demand from both land use planners and the brick industry. The District Geologist assisted with this project by consulting on drill site locations and evaluating drill company tenders.

OGS Sedimentary Geoscience program staff worked on the production of 2 Aggregate Resources Inventory Papers (ARIP). George Gao undertook fieldwork and data compilation for the Regional Municipality of Durham and Huron County. The purpose of the aggregate inventories is to delineate, define and evaluate the aggregate resource potential within the study areas. This information is used for infrastructure development and by the general construction industries, as well as for land use planning purposes.

The OGS Sedimentary Geoscience program staff initiated a project to build a digital, detailed, seamless Quaternary

geology map for southern Ontario that will be compatible with the Land Information Ontario (LIO) system under the stewardship of the Ministry of Natural Resources (MNR). The database is a response to rapidly increasing need to understand the inherent properties of the unconsolidated deposits that overlie the bedrock of southern Ontario for better urban development, agriculture, construction aggregate, industrial minerals, landfill, hazard lands, groundwater and surface water planning.

The Geological Survey of Canada continues to be active in southwest Ontario projects. Since 1993, GSC staff has been leading a geology and hydrogeology study of the Oak Ridges Moraine. The GSC released one summary report and two data publications from this project in 2001; these are listed in Table 4.

Additional selected publications received in 2001 by Southwest Ontario District Geology Office (Mines and Minerals Information Centre) that are of reference to southwest Ontario are listed in table 5.

ACKNOWLEDGEMENTS

The author would like to thank all mineral producers across southwest Ontario who provided access to their operations or supplied information throughout 2001. I thank Max Barua, acting Southwest Ontario District Support Geologist for his assistance in preparing this report.

I would like to thank the many individuals at the industrial mineral operations visited on field trips in 2001. In particular, I thank Gary Proctor and Dave McCarthy (Lafarge Canada Inc.), Frank Toffoli (Dundas Lime Limited), Jim Wilson and Sean Doherty (Dofasco Inc.), Bevan Ratcliffe (Arriscraft International Inc.), Steve McCallum (Owen Sound Ledgerock Ltd.), Frank Grieco (P.R. Engineering Ltd.), and Cathy Fletcher (Lakefield Research Ltd.). The organizations running the field trips and I acknowledge the generous support of the field trip sponsors and hosts.

The following companies in the southwest Ontario District are thanked for their donation of rock or mineral samples for teaching kits; The Canadian Salt Company Limited, Unimin Canada Inc., Canada Brick, Beachville Lime Limited, Rice and McHarg Quarries, Dufferin Aggregates and Fowler Construction.

REFERENCES

- Armstrong, D.K. 1993a. Paleozoic Geology of the Central Bruce Peninsula; Ontario Geological Survey, Open File Report 5856, 19p.
- Armstrong, D.K. 1993b. Paleozoic geology of Southern Bruce Peninsula, Southern Ontario; Ontario Geological Survey, Open File Report 5875, 19p.
- Armstrong, D.K. 2000. Paleozoic geology of the northern Lake Simcoe area, south-central Ontario; Ontario Geological Survey, Open File Report 6011, 52p.
- Armstrong, D.K. 2001a. A regional evaluation of the shale resources potential of the Upper Ordovician Queenston Formation, southern Ontario; Ontario Geological Survey, Open File Report 6058, 148p.
- Armstrong, D.K. 2001b. Geochemistry of Queenston Formation samples from outcrops, quarries and drill cores, southern Ontario; Ontario Geological Survey, Miscellaneous Release Data 77.
- Armstrong, D.K. and Anastas, A.S. 1993. Paleozoic geology of the Orillia area, southern Ontario; Ontario Geological Survey, Open File Map 222, scale 1:50 000.
- Armstrong, D.K. and Dubord, M.P. 1992. Paleozoic Geology, Northern Bruce Peninsula, Southern Ontario; Ontario Geological Survey, Open File Map 198, scale 1:50 000.
- Armstrong, D.K. and Frederic, J.C. 2001. Results of firing and properties testing, Queenston Formation shale, southern Ontario; Ontario Geological Survey, Miscellaneous Release Data 92.

- Armstrong, D.K. and Meadows, J.R. 1988. Stratigraphy and Resource Potential of the Eramosa Member, Bruce Peninsula, Ontario; Ontario Geological Survey, Open File Report 5662, 90p., and 1 map in back pocket.
- Armstrong, D.K. and Rheaume, P. 1994. Paleozoic geology, Fenelon Falls area, southern Ontario; Ontario Geological Survey, Open File Map 235, scale 1:50 000.
- Armstrong, D.K. and Rheaume, P. 1995. Paleozoic geology of the Penetanguishene-Elmvale area, southern Ontario; Ontario Geological Survey, Preliminary map P.3339, scale 1:50 000.
- Kelly, R.I., 1996. High-Purity Calcite and Dolomite Resources in Ontario; Ontario Geological Survey, Open File Report 5954, 39p.
- Steele, K.G. 2001. Southern Ontario Regional Resident Geologist – Southwest Ontario District – 2000 *in* Report of Activities, 2000, Resident Geologist Program, Southern Ontario Regional Resident Geologist Report; Ontario Geological Survey, Open File Report 6052.

Figure 1. Producing Mines and Quarries – Southwest Ontario District, 2001.

	Producing Mines	
	1. Sifto Canada Inc., Goderich Mine, Goderich	rock salt
	2. The Canadian Salt Company Ltd., Ojibway Mine, Windsor	rock salt
	3. Georgia Pacific Canada Inc., Caledonia No. 3 Mine, Caledonia	gypsum
	4. CGC Inc., Hagersville Mine, Hagersville	gypsum
	Producing Quarries – Cement	
	5. Lafarge Canada Inc., Woodstock Quarry, Zorra Tp.	limestone
	6. St. Marys Cement Inc., St. Marys Quarry, Blanshard Tp.	limestone
	7. St. Marys Cement Inc., Bowmanville Quarry, Darlington Tp.	limestone
	8. St. Lawrence Cement Inc., Mississauga Quarry, Mississauga	shale
	Producing Quarries – Brick Products	
	9. Brampton Brick Ltd., Cheltenham Quarry, Chinguacousy Tp.	shale
	10. Canada Brick, Streetsville Quarry, Mississauga (closed December 2001)	shale
	11. Canada Brick, Milton Quarry, Esquesing Tp.	shale
	12. Canada Brick, Burlington Quarry, Burlington	shale
	13. Canada Brick, Aldershot Quarry, Burlington	shale
	14. George Coultis and Son Ltd., Thedford Quarry, Bosanquet Tp.	shale
	15. Century Brick, Georgetown Quarry, Esquesing Tp.	shale
	Producing Quarries – Chemical, Metallurgical, & Filler Stone Products	
	16. Lafarge Canada Inc., Dundas Quarry, West Flamborough Tp.	dolomite
	17. Beachville Lime Ltd., Centre Quarry, Zorra Tp.	limestone
	18. Guelph Lime Ltd., Guelph Quarry, Guelph (suspended operations June 2001)	dolomite
	19. E. C. King Contracting Ltd., Sydenham Quarry, Sydenham Tp.	dolomite
	Producing Quarries – Dimension, Building, Landscape Stone	
	20. Ebel Quarries Inc., Arnold property Quarry, Amabel Tp.	dolostone
	21. Arriscraft International Inc., Adair Marble Quarries, Albemarle Tp.	dolostone
	22. Owen Sound Ledgerrock Ltd., Senesun Quarry, Amabel Tp.	dolostone
	23. Owen Sound Ledgerrock Ltd., Wiarton Quarry, Amabel Tp.	dolostone
	24. Owen Sound Ledgerrock Ltd., Owen Sound Quarry, Keppel Tp.	dolostone
	25. Ebel Quarries Inc., Ebel Quarry, Amabel Tp.	dolostone
	26. Bruce Peninsula Stone Ltd., Lindsay Quarry, Lindsay Tp.	dolostone
	27. Amsen Quarries Ltd., Mar Quarry, Albemarle Tp.	dolostone
	28. Amsen Quarries Ltd., Wiarton Quarry, Amabel Tp.	dolostone
	29. Bruce Peninsula Stone Ltd., Ross property Quarry, Amabel Tp.	dolostone
	30. Speiran Quarries Ltd., Speiran Quarry, Ramara Tp.	limestone
	31. Deforest Brothers Quarry Ltd., Deforest Brothers Quarry, Caledon Tp.	sandstone
	32. Hilltop Stone and Supply Inc., Hilltop Quarry, Esquesing Tp.	sandstone
	33. Rice and McHarg Ltd., Rice and McHarg Quarry, Esquesing Tp.	dolostone
	34. Georgian Bay Marble and Stone, Wiarton Quarry, Amabel Tp.	dolostone
	35. Georgian Bay Marble and Stone, Cook Quarry, Amabel Tp.	dolostone
	36. Flamboro Quarries Ltd., Flamboro Quarry, West Flamborough Tp.	dolostone
	37. A & A Natural Stone Ltd., A & A Quarry, Keppel Tp.	dolostone
	38. Cut Above Natural Stone, Cut Above Natural Stone Quarry, Rama Tp.	limestone
	39. Rama Stone Quarries Ltd., Fleming Quarry, Rama Tp.	gneiss
	40. Wiarton Stone Quarry Inc., Wiarton Stone Quarry, Amabel Tp.	dolostone
	41. Stone Cottage Inn Ltd., Attia Quarry, Rama Tp.	dolostone
	Producing Brine Well Fields – Salt	
	42. General Chemical Canada Ltd., Anderdon Brine Field, Anderdon Tp. (suspended operations March 2001)	salt in brine
	43. Sifto Canada Inc., Goderich Brine Field, Goderich	salt in brine
	44. The Canadian Salt Company Ltd., Windsor Brine Field, Windsor	salt in brine



SOUTHWEST ONTARIO DISTRICT - 2001

Table 1. Selected industrial mineral production in Ontario.

	1998	1998	1999	1999	2000p	2000p
	Quantity	Value	Quantity	Value	Quantity	Value
	Thousands tonnes	Thousands dollars	Thousands tonnes	Thousands dollars	Thousands tonnes	Thousands dollars
Non-metals						
Gypsum (1)	1 047	14 780	1 036	14 677	933	12 917
Salt (1)	8 344	248 020	7 745	230 153	7 174	200 002
Total, Non-metals		375 446		384 102		379 540
Structural Materials						
Clay products (2)	y	102 616	y	128 682	y	134 036
Cement (5)	5 191	460 179	5 530	510 532	5 344	507 182
Lime (3)	1 334	108 766	1 384	121 913	1 313	117 105
Sand and Gravel (4)	88 186	325 109	86 705	321 663	115 478	413 459
Stone * (4)	50 689	344 707	49 602	360 238	55 204	434 935
Total, Structural Materials		1 341 377		1 555 174		1 606 717
Total, Industrial Minerals		1 760 546		1 969 623		2 016 589

- (1) all production from Southwest Ontario District
- (2) 95% production from Southwest Ontario District
- (3) >90% production from Southwest Ontario District
- (4) >75% production from Southwest Ontario District
- (5) >50% production from Southwest Ontario District

p preliminary data only

y data not available

* production represents quarry shipments of crude or undressed stone, crushed stone and dressed stone, if the latter is prepared by the quarry operators at values as reported by operators, includes crushed rock aggregate, trap rock, specialty aggregate, dimension stone, calcium carbonate

after Ontario Mineral and Exploration Statistics 2000, MNDM 2001

Table 2. Mine production and reserves in the Southwest Ontario District (as reported by companies to the District Geologist).

Mine	2001 Production Tonnage @ Grade	2000 Production Tonnage @ Grade	1999 Production Tonnage @ Grade	1998 Production Tonnage @ Grade	Reserves end of 2001 Tonnage @ Grade
Caledonia No. 3 Mine	272 240 t @ 75-80% gypsum	287 000 t @ 75-80% gypsum	418 000 t @ 75-80% gypsum	400 000 t @ 70-75% gypsum	39 200 000 t @ 70-75% gypsum
Hagersville Mine	700 000 t @ 85% gypsum	700 000 t @ 85% gypsum	725 000 t @ 85% gypsum	680 000 t @ 85% gypsum	11 600 000 t @ 85% gypsum
Goderich Mine	6 002 000 t @ 97% NaCl	4 200 000 t @ 97% NaCl	4 750 000 t @ 97% NaCl	6 000 000 t @ 97% NaCl	350 000 000 t @ 97% NaCl
Ojibway Mine	2 600 000 t @ 97% NaCl	2 350 000 t @ 97% NaCl	2 436 000 t @ 97% NaCl	2 500 000 t @ 97% NaCl	86 600 000 t @ 97% NaCl

t = tonne

SOUTHWEST ONTARIO DISTRICT – 2001

Table 3. Property visits conducted by the Southwest Ontario District Geologists in 2001. (Number in brackets after property name indicates number of visits.)

Property/Occurrence/Plant/Geological Site	Location	Commodity
Rice & McHarg Quarry (2)	Esquesing Tp.	Sandstone/building stone
Dufferin Aggregates – Milton Quarry	Esquesing Tp.	Dolostone/aggregate
Canada Brick – Milton Quarry	Milton	Shale
Beachville Lime Ltd. – Beachville operations	Zorra Tp.	Limestone/lime
Hilltop Stone & Supply Inc. Quarry	Esquesing Tp.	Sandstone/building stone
Unimin Canada – Midland operations	Midland	Silica
Fowler Construction – Rama Quarry	Rama Tp.	Gneiss/trap rock
Fowler Construction – Longford Quarry	Rama Tp.	Limestone/aggregate
Canada Brick – Streetsville Quarry	Mississauga	Shale/brick
Lafarge Canada Inc. – Dundas Quarry (2)	West Flamborough Tp.	Dolostone/aggregate
E.C. King Contracting – Sydenham Quarry	Sydenham Tp.	Dolostone/aggregate
E.C. King Contracting – Owen Sound Plant	Owen Sound	Glass grade dolomite
Owen Sound Ledgerrock Ltd. – Owen Sound Plant (2)	Keppel Tp.	Dimension stone
Owen Sound Ledgerrock Ltd. – Wiarton Quarry (2)	Amabel Tp.	Dolostone/marble/building stone
Amsen Quarries – Wiarton Quarry	Amabel Tp.	Dolostone/building stone
Arriscraft International Inc. – Adair Marble Quarry (2)	Albemarle Tp.	Dolostone/marble/building stone
PPG Canada – Owen Sound Glass Plant	Owen Sound	Glass
Dundas Lime Ltd. – Dundas Plant (2)	West Flamborough Tp.	Dolomite
Dofasco – Hamilton steel making operations (2)	Hamilton	Steel
Ebel Quarries Inc. – Arnold property Quarry	Amabel Tp.	Dolostone/building stone
OGS shale project drill site - Meaford	St. Vincent Tp.	Shale
Scott Clay Products Inc. – Meaford offices	Meaford	Shale products
Lafarge Canada Inc. – Mosport Pit	Manvers Tp.	Sand and gravel
Lakefield Research Ltd. – Lakefield operations	Lakefield	Mineral processing
P.R. Engineering – Oshawa operations	Oshawa	Crusher construction
OMYA Canada Inc. – Perth Plant	Perth	Calcium carbonate
St. Lawrence Cement Inc. – Ogden Point Quarry	Cramahe Tp.	Limestone

Table 4. New Ontario Geological Survey (OGS) and Geological Survey of Canada (GSC) publications on Southwest Ontario released in 2001.

Title	Author	Type and Year of Publication
Report of Activities 2000, Resident Geologist Program, Southern Ontario Regional Resident Geologist Report: Southeastern and Southwestern Districts, Mines and Minerals Information Centre, and Petroleum Resources Centre	Sangster, P.J., McGuinty, W.J., Papertzan, V.C., Steele, K.G., Lee, C.R., Laidlaw, D.A., Carter, T.R., Spears, G.J., Debicki, R. and Rowell, D.	Ontario Geological Survey, Open File Report 6052, 108p., 2001
Results of firing and properties testing, Queenston Formation shale, southern Ontario	Armstrong, D.K. and Frederic, J.C.	Ontario Geological Survey, Miscellaneous Release - Data 92, 2001
Geochemistry of Queenston Formation samples from outcrops, quarries and drill cores, southern Ontario	Armstrong, D.K.	Ontario Geological Survey, Miscellaneous Release - Data 77, 2001
A Regional Evaluation of the Shale Resource Potential of the Upper Ordovician Queenston Formation, Southern Ontario	Armstrong, D.K.	Ontario Geological Survey, Open File Report 6058, 148p., 2001
Aggregate Resources Inventory Projects of the regional Municipality of York and Huron County	Gao, C.	<i>In</i> Summary of Field Work and Other Activities 2001, Ontario Geological Survey, Open File Report 6070, 402p., 2001
A Seamless Quaternary Geology Map of Southern Ontario	Bajc, A., Leney, S., Evers, S., van Haaften, S., and Ernsting, J.	<i>In</i> Summary of Field Work and Other Activities 2001, Ontario Geological Survey, Open File Report 6070, 402p., 2001
A Resource Evaluation of the Upper Ordovician Shales of Southern Ontario	Armstrong, D.K.	<i>In</i> Summary of Field Work and Other Activities 2001, Ontario Geological Survey, Open File Report 6070, 402p., 2001
Seismic reflection profiles and their contribution to the development of a geological model of the Oak Ridges Moraine area, southern Ontario	Pugin, A., Pullan, S.E. and Sharpe, D.R.	Geological Survey of Canada, Open File Report 3561, 1 colour poster, 2001
Bedrock topography and sediment thickness DEMs of the Greater Toronto and Oak Ridges Moraine areas, southern Ontario	Russell, H.A.J. and Stacey, P.	Geological Survey of Canada, Open File Report 3699, 1 CD-ROM, 2001
Regional three-dimensional stratigraphic modelling of the Oak Ridges Moraine area, southern Ontario	Logan, C., Russell, H.A.J., and Sharpe, D.R.	2001-D1 <i>In</i> Current Research 2001, Eastern Canada and national and general programs, Geological Survey of Canada, 2001
Near-surface seismic methods applied to site-response characterization at an earthquake monitoring station near London, Ontario	Benjumea, B., Pullan, S.E., Hunter, J.A., Burns, R.A., Douma, M. and Eaton, D.	2001-E7 <i>In</i> Current Research 2001, Eastern Canada and national and general programs, Geological Survey of Canada, 2001

SOUTHWEST ONTARIO DISTRICT – 2001

Table 5. Selected publications received in 2001 by Southwest Ontario District Geology Office (Mines and Minerals Information Centre) of particular reference to southwest Ontario.

Title	Author	Type and Year of Publication
Ontario Mining & Exploration Directory 2001	Hannay, M. (ed.)	Directory, Naylor Publications Company (Canada), Winnipeg, 54p., 2001
1999 Canadian Minerals Yearbook: Review and Outlook	Godin, E. (ed.)	Minerals and Metals Sector, Natural Resources Canada, Ottawa, 2001
Canadian Mines Handbook 2001-02	Giancola, D. (ed.)	Southam Mining Group, Toronto, 544p., 2001
2001/02 CAMESE Compendium of Canadian Mining Suppliers	Baird, J.G., Director	The Canadian Association of Mining Equipment and Services for Export, Markham Ontario, 178p., 2001
The geology and mineral aggregate potential of the Oak Ridges Moraine, Ontario	Barnett, P.J. and Rowell, D.J.	p. 151-157 in <i>Industrial Minerals in Canada</i> , S. Dunlop and G.J. Simandl (eds.), CIM Special Volume 53, 2001
Known and potential sources of high-purity calcite and dolomite in Ontario	Kelly, R.I.	p. 137-149 in <i>Industrial Minerals in Canada</i> , S. Dunlop and G.J. Simandl (eds.), CIM Special Volume 53, 2001
Ontario's industrial mineral industry: an overview	Gerow, M., Sangster, P. and Steele, K.	p. 133-135 in <i>Industrial Minerals in Canada</i> , S. Dunlop and G.J. Simandl (eds.), CIM Special Volume 53, 2001
Illinoian to late Wisconsinan stratigraphy at Woodbridge, Ontario	Karrow, P.F., McAndrews, J.H., Miller, B.B., Morgan, A.V., Seymour, K.L. and White, O.L.	p. 921-942 in <i>Canadian Journal of Earth Sciences</i> , Volume 38, Number 6, June 2001
Minerals and Metals: Towards a Sustainable Future	Natural Resources Canada	Monograph No.10, Minerals and Metals Sector, Natural Resources Canada, Ottawa, 18p., 2000
Progress Report 2000 Mines and Minerals Division	Mines and Minerals Division	Progress Report, Mines and Minerals Division, MNDM, Sudbury, 70p., 2001
Facts and Figures 2000	The Mining Association of Canada	Facts and Figures, The Mining Association of Canada, Ottawa, 64p., 2001
"4M – Milling, Moraine, Metallurgical/mineralogical, Mining"	Steele, K., Sangster, P. and Borland, J.	Field Trip Guidebook, CIM Toronto Branch, Toronto, 21p., 2001
"Stone to Steel - following dolomite from the quarry through the steel making process"	Steele, K. and Borland, J.	Field Trip Guidebook, CIM Toronto Branch, CIM Industrial Minerals Division, Ontario Ministry of Northern Development and Mines, Toronto, 24p., 2001
Ontario Exploration	Ellis, R. (ed.)	Special Supplement, The Mining Journal Ltd., London, 52p., 2001

Table 6. Mineral deposits not being mined in the Southwest Ontario District in 2001. (IMR = Industrial Mineral Report.)

Abbreviations					
AF	Assessment Files	MLS	Mining Lands, Sudbury		
CMH	Canadian Mines Handbook	MR	Mining Recorder		
GR	Geological Report	NM	The Northern Miner		
MDC	Mineral Deposit Circular	OFR	Open File Report		
MDIR	Mineral Deposit Inventory record	PC	Personal Communication		

Deposit Name/ NTS	Commodity	Tonnage-Grade Estimates and/or Dimensions	Ownership References	Reserve References	Status
Amherstburg Quarry Silica Prospect (40J/03SE)	Silica	20 m thick over 66 ha (20-26 by 10 ⁶ t @ 94% SiO ₂)	Amherst Quarries (1969) Ltd.	OFR 5861, p. 32 IMR 9, p. 29, 31	Inactive
Big Creek 1 (40J/03SE)	Silica	19.5 m thick @ 25 m (10 by 10 ⁶ t of sandstone)	N/A	IMR 9, p. 29	Inactive
Big Creek 1 (40J/03SE)	Silica	14.6 m thick @ 34.4 m (10 by 10 ⁶ t of sandstone)	N/A	IMR 9, p. 29	Inactive
Dow-Moore 2-20-12 (40J/16NW)	Salt	21 m thick @ 698 m 73 m thick @ 582 m 114 m thick @ 410 m	N/A	PRW Dow-Moore 2-20-XII	Inactive
Eastnor-Lindsay Prospect (41H/03SW)	Dolomite	60 by 10 ⁶ t dolomite @ <0.10% impurities (SiO ₂ +Fe ₂ O ₃ +Al ₂ O ₃)	N/A	PRW OGS Lindsay 7-III W	Inactive
Imperial Oil No. 560, Sombra 2-12-H, Gormlay No. 1 (40J/09NW)	Salt	32.2 m thick @ 612.6 m 84.1 m thick @ 490.7 m 46.9 m thick @ 388.6 m	N/A	PRW Sombra 2-12-H	Inactive
Imperial Oil No. 597, Logierait No. 1-Y-R, R.C. Fleck No. 2B (40J/16NW)	Salt	29.6 m thick @ 680 m 87.8 m thick @ 544 m	N/A	PRW Imperial Oil No. 597B	Inactive
Lindsay Prospect (41H/03SW)	Dolomite	>35 by 10 ⁶ t dolomite @ <0.10% impurities (SiO ₂ +Fe ₂ O ₃ +Al ₂ O ₃)	N/A	PRW OGS Lindsay 31-VIII W	Inactive
Patton Farm (40J/03SE)	Silica	5.4 m thick @ 10.1 m	N/A	IMR 9, p. 29	Inactive

SOUTHWEST ONTARIO DISTRICT - 2001

Deposit Name/ NTS	Commodity	Tonnage-Grade Estimates and/or Dimensions	Ownership References	Reserve References	Status
Sunburst GB #7 McGillivray 41-NB (40P/04NE)	Salt	88.7 m thick @ 363.6 m 5.8 m thick @ 339.5 m	N/A	PRW Sunburst GB #7	Inactive
Tobermory Prospect (41H/04NE)	Dolomite	60 by 10 ⁶ t dolomite @ <0.10 impurities (SiO ₂ +Fe ₂ O ₃ +Al ₂ O ₃)	N/A	PRW OGS St. Edmunds 47-III W	Inactive
Union Gas- Enniskillen No. 29, D.V.L.A. No. 1 (40J/16SW)	Salt	25.6 m thick @ 610.8 m 78.6 m thick @ 485.5 m	N/A	PRW Union Gas- Enniskillen No. 29	Inactive
Union Gas-Moore No. 12 P&I Williams No. 1 (40J/16SW)	Salt	26.2 m thick @ 577.3 m 70.7 m thick @ 456.6 m	N/A	PRW Union Gas- Moore No. 12- P&I Williams No. 1	Inactive
Union -Moore No. 22 (40J/16SW)	Salt	36 m thick @ 580 m 32 m thick @ 437 m	N/A	PRW Union Moore No. 22	Inactive



**Ontario Geological Survey
Regional Resident Geologist Program**

Mines and Minerals Information Centre—2001

by

W.J. McGuinty and C.R. Lee

2002

CONTENTS

Mines and Minerals Information Centre–2001

Part One MMIC Activities

Introduction.....	1
MMIC Staff Functions	1
MMIC Client Profile.....	1
MMIC Services.....	2
ERLIS/ERMES/Geoscience Databases	2
Library Services.....	2
Publication Sales.....	3
Rock Suites and Displays.....	3
Education Activities.....	3
Industry Liaison Geologist Outreach and Promotion Activities.....	4
Industry Liaison Geologist Information Activities – Regulatory	5
Industry Liaison Geologist Information Activities – Industry Support	8
Acknowledgements	11

Tables

1. Newsletters received by MMIC library in 2001	12
2. Journals and periodicals received by MMIC library in 2001	13
3. New reference publications received by MMIC library in 2001	14
4. Ontario Geological Survey publications received by MMIC library in 2001.....	16
5. Geological Survey of Canada publications selected for the MMIC library in 2001.....	26

Part Two 'Super Flow-Through' Mapping Project

Introduction.....	28
Rationale for Study	28
Proposed Outcomes of Study	29
Initial Literature and Resource Survey.....	29
Flow-Through Mapping Project - Study Parameters.....	30
Data Acquisition Phase	31
Financial Data Collection Method	32
Verification of Financing Information	32
Limitations on the Information Gathered	32
Summary Findings	33

Tables

2.1. Flow-through financing study – summary of observations.....	36
2.2. Identified companies with Ontario properties having announced financings in 2001	37

Charts

2.1. Distribution of reporting public companies on SEDAR mining listings	35
2.2. Distribution by geographic region of exploration company activity	35

Mines and Minerals Information Centre—2001

W.J. McGuinty¹ and C.R. Lee²

¹Industry Liaison Geologist, Ontario Geological Survey

²Regional Support Geologist, Ontario Geological Survey

INTRODUCTION

The Mines and Minerals Information Centre (MMIC) is an information, research and sales facility for the Mines and Minerals Division (MMD), Ministry of Northern Development and Mines (MNDM). The Centre serves the mineral exploration, mining, earth science and land use planning communities and the general public. MMIC offers a wide variety of information and research materials as well as advisory services and expertise on Ontario's geology, rocks and minerals, mineral industries and related regulations and policy. MMIC staff members also provide specific assistance and referral for clients who require information concerning the Ontario Mining Act and assistance obtaining geoscience information which is administered, developed and maintained by other ministries, such as soils (OMAFRA), pits, quarries, aggregates and oil & gas (MNR) and water (MOE).

MMIC STAFF FUNCTIONS

During 2001, MMIC was staffed and supported by 5 members of the Ontario Resident Geologist Program. Ken Steele, Southwest Ontario District Geologist provides specific assistance and expertise regarding the geology, resources and minerals industry in southwestern Ontario with the assistance of the Southwest Ontario District Support Geologist (DSG). Lindsay Hall occupied the DSG position in early 2001, being succeeded by Max Barua at mid year. Charley Lee, Regional Support Geologist for Southern Ontario provides lead service for the delivery of ERLIS and ERMES information systems and MMIC library functions. Bill McGuinty, Industry Liaison Geologist provides assistance to minerals industry clients in accessing geoscience and mineral related expertise and policy information from the Ministry of Northern Development and Mines as well as other pertinent industry information. All MMIC Geoscience staff is supported by inquiry and administration support person Jennifer John, who provides primary reception/front counter and cashier services and maintains inventories of Ontario geoscience publications for sale.

All MMIC staff participate in front counter and phone client service functions with the general public.

The Mines and Minerals Information Centre benefited from the assistance of two Ontario Summer Experience Program students, Sandra Oh and Alim Lalani and Ontario - Quebec Exchange Program student, Charles Gagnon, during the summer period. These students provided support to public outreach projects that MMIC and the Southwest Ontario District Geologist office were undertaking and gained a knowledge of the operations of the Ontario Geological Survey through working with staff and assisting clients at MMIC.

MMIC CLIENT PROFILE

The Mines and Minerals Information Centre has a wide variety of clients and users. The greater Toronto area contains one of the largest groupings of geoscientists, minerals industry specialists, mining and mining service companies in the world and MMIC counts members of these communities as its core clientele. In addition, industry and government professionals, university and college staff and students in geoscience, engineering, architecture and land use planning use MMIC resources for research projects.

Approximately 75% of Ontario residents (about 8 million people) have MMIC as their nearest and primary MNDM

contact point. Walk-in, phone and mail clients from the general public make a wide range of inquiries to staff about geology, educational resources in earth science and the mining and minerals industry and mining history.

Over the past 2-3 years, approximately 5500 clients per year contact the MMIC. A general breakdown of these clients is:

- 2000 general inquiries via the telephone;
- 2400 walk-in clients to use general inquiry/sales/research functions; and
- 1100 telephone and walk-in clients with specific Southwest Ontario District queries handled by District staff.

MMIC SERVICES

ERLIS/ERMES/Geoscience Databases

The Earth Resources and Land Information System (ERLIS) is an electronic archival database of Ontario's geoscience information. ERLIS provides MMIC clients with electronically archived mineral exploration and geoscience information. Data sets available on ERLIS contain the following information:

- Mineral exploration assessment work reports filed by mineral industry workers, as part of their obligations under the Mining Act, to maintain their exploration properties in good standing. Over 70 years of this type of reporting is recorded. Assessment reports may include such information as geological maps, geophysical survey results, drill hole logs and locations, and geochemical and assay data.
- Mineral deposit inventory (MDI) records for more than 18,000 mineral occurrences province-wide and their localities along with lithological, lithochemical and tectonic assemblage data.
- Information for Ontario as compiled and collected by the Ontario Geological Survey.

ERLIS offers clients data search, compilation and integration capabilities through 2 workstations located at MMIC. The system is available for data searches and compilations at no charge. Printed materials in colour or black and white, or digital downloaded products such as maps and text are available at a nominal fee.

Currently, ERLIS is undergoing a transformation to becoming an Internet-based data storage and retrieval system called the Earth Resources and Minerals Exploration webSite (ERMES), which forms part of the Land Information Ontario (LIO) system of digital information. Due to the large data volumes available on ERMES, computer access using high speed or cable Internet capability is recommended. As of January 2002, access to ERMES will be offered through terminals located at MMIC. ERLIS will be decommissioned in September 2002. ERMES offers scanned image files of information currently available through ERLIS, as well as new digital geoscience data and products, including all maps and reports produced by the Ontario Geological Survey and its predecessor organizations.

Library Services

The MMIC library provides a selection of reference and topical information on earth science and the minerals industry. Directories, science and industry periodicals and journals are available to clients. Table 1 lists current subscriptions to geoscience and mining related newsletters. Table 2 lists the journals and periodical publications added to the MMIC library during 2001.

A limited number of texts and other reference materials are acquired annually for the library based on industry trends and advances in geoscience. Table 3 summarizes the reference materials acquired in 2001. Computer based reference databases are available for both the MMIC library and the MNDM library in Sudbury. Clients may request inter-library loans and transfers from other MMD offices.

The MMIC library also maintains and updates the complete collection of OGS publications, dating from 1891, and most publications of the Geological Survey of Canada (GSC), dating from 1863, that relate to Ontario. Table 4 lists the OGS publications received and Table 5 lists GSC publications acquired during 2001.

Publication Sales

MMIC serves as a walk-in sales outlet in Toronto for publications produced by the Mines and Minerals Division (MMD), particularly the Ontario Geological Survey (OGS). MMIC maintains a retail stock of over 10 000 different Ontario geoscience publications, including:

- Geological, geophysical, geochemical and aggregate resource maps and reports;
- Minerals industry statistics and annual activity reports;
- Mineral policy papers;
- Industrial mineral and mineral deposit circulars;
- Geology guidebooks and posters; and
- Open File Reports.

New MMD hardcopy publications are available at MMIC following their publication release dates. Limited quantities of certain publications such as Open File Reports are available for sale at the Centre while supplies last, after which time such products may be purchased on-demand from the Ministry's Publication Sales Centre located in Sudbury.

Requests for publications made via telephone, mail or e-mail as well as all requests for digital data sets are referred to the Publication Sales Centre for on-demand purchase and distribution.

Rock Suites and Displays

In addition to the Centre's traditional library and computer based geoscience information resources, the MMIC also hosts an extensive rock and mineral collection for display purposes and as archived resource material. This collection is used to promote various minerals-related Ontario industries such as the province's growing dimension stone (granite/marble etc.) business. Ontario stone products are used in wall and counter construction at the MMIC to promote these materials as architectural alternatives. Clients and staff use displays and samples as part of their research. Other samples and displays have a museum format and are used for educational purposes and exhibitions.

Education Activities

MMIC summer experience students assisted the Southwest District Geologist and the District Support Geologist in collecting materials for the preparation of "Mining Matters II". Mining Matters II is an educational product designed by the Prospectors and Developers Association of Canada to assist Ontario public school teachers in delivering the revised earth sciences curriculum initiated in 2000 by the Ontario Ministry of Education.

Many educators in the Ontario elementary school systems, particularly those teaching grades 4 and 7, contact the MMIC for resource materials to assist in the design of geoscience education components. Kits containing information about Ontario mines and mineral products, geoscience, geology, rocks and minerals are provided on request. Additional Internet and local sources of relevant earth science information such as Mining Matters are also provided.

The MMIC also conveys requests by teachers for guest speakers to talk about geology back to the local geoscience community. This means of engaging local industry members in public outreach about minerals and geoscience has elicited a positive response from both geologists and teachers in the Greater Toronto area.

INDUSTRY LIAISON GEOLOGIST OUTREACH AND PROMOTION ACTIVITIES

In support to promoting MNDM activities and initiatives, the Industry Liaison Geologist attended a number of symposia and conferences during the year. Attending these events also facilitated obtaining client interaction and commentary on the state of exploration and development in Ontario, Canada and abroad. The following mineral industry related events were attended:

- Prospectors and Developers Association of Canada Convention (March 2001, Toronto)
- Northeastern Ontario Mines and Minerals Symposium (April 2001, Sudbury)
- Northwestern Ontario Mines and Minerals Symposium (April 2001, Thunder Bay)
- PricewaterhouseCoopers Sustainable Mining Conference (June 2001, Toronto)
- Ontario Exploration and Geoscience Symposium (December 2001, Toronto (speaker))

In addition to these formal events, the Industry Liaison Geologist attended regularly scheduled meetings of several industry related organizations throughout the year, including the Toronto Geological Discussion Group (TGDG), the Halton Area Geological Society, the Toronto Branch of the Canadian Institute of Mining Metallurgy and Petroleum and the CIM Mineral Economics Society.

2001 Ontario Exploration and Geoscience Symposium

The Ontario Prospectors Association hosted their second annual Ontario Exploration and Geoscience Symposium in Toronto on December 10th, 11th and 12th, 2001, entitled "Ontario: The Source for the World's Commodities". More than 425 delegates registered for the event, which highlighted 50 poster and 20 booth displays related to Ontario Government geoscience projects and activities; private sector exploration projects; and industry services available to minerals explorers in Ontario. Also featured were more than 40 professional presentations covering a wide range of commodities and geological research.

The Canadian Exploration Geophysicists Society (KEGS) ran a concurrent, 1-day symposium on December 11th that focused on the impacts and results of MNDM's 3-year, Operation Treasure Hunt project. KEGS members made fourteen presentations. Registration and talk schedules for both events ran concurrently with matching breaks and social activity schedules. Attendees at both events were allowed access to all talks and displays.

In addition to the 2-day symposium, the OPA offered 1-day short courses on Exploration Geochemistry, organized by ActLabs and on Rare Metal Rock and Mineral Identification for Prospectors, organized by the Ontario Geological Survey. A workshop on First Nations Consultation was also held during the Symposium. Over 150 people participated in the short-courses and workshop.

The Ministry of Northern Development and Mines supported this event by supplying conference facilities at the Macdonald Block, 900 Bay Street in Toronto, as well as presenting geoscience talks and poster displays.

The Industry Liaison Geologist (ILG) provided support for the event by making arrangements for the facilities, catering, the publication of materials, mail and Internet promotion and speaker co-ordination. The ILG also provided a presentation to delegates on the interim results of a study that he is currently conducting on flow-through share financings in Ontario.

Industry Liaison Presentations

The Industry Liaison Geologist made numerous formal and informal presentations throughout the year, mainly in the form of short overviews on the mining sector's activities in Ontario and the province's regulatory and policy approaches designed to encourage and promote mineral exploration.

Several presentations were made at venues related to the Prospectors and Developers Association Convention held in

March. Tours and talks were provided to delegates visiting the Ontario Pavilion, including China, Chile, Nicaragua, Guatemala and South Africa and Mexico.

A presentation was also made during the Convention to attendees of a luncheon hosted by Ontario Exports Inc. The guests included a delegation of Russian Northern Chambers of Commerce, as well as representatives of the Canada Russia Business Forum, and the Department of Indian and Northern Affairs. Ontario Exports is working with Canada and Russia in pursuit of international Northern Development objectives.

Later in the year, the ILG gave an overview of Ontario's mineral potential and mining sector to the Korea Resources Corporation at the request of Natural Resources Canada. KORES has established a new mineral development office in Toronto that focuses on the Americas.

The ILG also made a presentation to the Senior Trade Commissioner from South Africa, profiling the various components of the mineral exploration sector in Ontario, their economics, operations and objectives.

Mining Journal – Ontario Publication

In July, the Ontario Prospectors Association (OPA) and the London, UK-based, Mining Journal agreed to create an OPA-sponsored theme publication about Ontario's tremendous exploration potential, with articles ranging from rocks to services to knowledge resources. The idea and some of the underpinnings of publication layout were suggested by Terry Bottrill, editor of the 2000 Mining Journal supplement on Toronto. An editorial committee for the Ontario edition, consisting of Lynda Bloom of Analytical Solutions, Phil Burt of Burt Consulting Services and Bill McGuinty of the MMIC, began seeking contributions of articles from target minerals industry groups and individuals in August. Staff of the OGS Resident Geologist Program provided exploration activity updates and exploration recommendations for the publication.

The OPA invited other groups having Ontario members and interests, including CAMESE, KEGS and TGDG to discuss broad outlines and business needs for such a publication. The basic design concept was to frame mineral potential, exploration and development opportunities within the context of Ontario's broad foundation of advanced industry services and human, technical and financial resources. Ontario Exploration was published by the Mining Journal in November.

INDUSTRY LIAISON GEOLOGIST INFORMATION ACTIVITIES – REGULATORY

As part of the information gathering function of the Mines and Minerals Information Centre, the ILG monitors changes to the regulatory environment that may impact on the province's minerals industry. MMIC keeps topical information available at the Macdonald Block and communicates with industry associations regarding possible impacts and outcomes. 2001 was a watershed year for the minerals industry in that almost all of the major operating rules relating to reporting of corporate and technical activities, and to the trading of equity, were reviewed and modified. The following is a sampling of the changes that were monitored during the year.

OPA Securities Committee

On August 2nd, a committee was formed to review access to capital for exploration companies in Ontario. Andy Chater, chair of the Committee and a director of the Ontario Prospectors Association (OPA), explained that the OPA had created this committee to help alleviate regulatory restrictions on the raising of capital and its use. Many OPA members believe this issue has become a significant factor in the decline of mineral exploration in Ontario. The committee is to provide constructive suggestions for regulatory improvement to government agencies responsible for regulation of the industry. Several Ontario government agencies are invited to observe the meetings and provide input, including the Ontario Securities Commission, Ministry of Finance and MNDM. The ILG participates as an observer on behalf of MNDM.

The committee is trying to determine what the most pressing problems are for accessing capital and trying to identify and evaluate possible solutions. Key factors already identified by the group include liquidity challenges for currently unlisted companies and increasingly heavier regulatory burdens for both the listed and the unlisted. The group will address financing issues as they apply to exploration companies, particularly those that are in the process of becoming listed on stock exchanges. This is a crucial stage where the costs of maintaining liquidity for shareholders is at risk from the interplay between investor interests during various stages of mineral commodity pricing cycles and the evolution of higher expectations from exchanges and securities regulators. The group is evaluating current and pending Canadian regulations regarding financing and corporate operations, as well as alternative trading mechanisms for non-exchange listed companies that operate elsewhere around the world, such as Ofex in Britain and the Bloomberg pink sheets in the United States. Minutes of committee meetings will be made available via the OPA website in the near future.

New Disclosure Rules for Mineral Projects

On December 20, 2000, the Minister of Finance approved National Instrument 43-101 - Standards of Disclosure for Mineral Projects and Form 43-101F1. The National Instrument, the Companion Policy and the Form came into effect on February 1, 2001.

The completed NI 43-101 is the culmination of the review and research process undertaken by the Mining Standards Task Force, established in 1997 by the Ontario Securities Commission and the Toronto Stock Exchange. The Task Force mandate was to improve the disclosure framework for results of mineral exploration projects that had been previously reported using parameters established under National Policies 2-A and 22. The Task Force considered technical reporting practices within the mineral exploration and finance industries and studied significant technologies of common use in the industry. Submissions to the Task Force by individuals and groups from the mining sector were also included as part of the study.

Two significant features of NI 43-101 are the changes to the guidelines for the reporting of mineral reserves and the definition of the roles and responsibilities of the Qualified Person. The Canadian Institute of Mining, Metallurgy and Petroleum (CIM) has submitted new guidelines for the definitions of ore reserves, which are now accepted as the reference for reporting under the new instrument. These guidelines are available for viewing at www.cim.org/definitions/CIMdef1.PDF.

The development of the Qualified Person concept in Canada by the Mining Standards Task Force and subsequently by NI 43-101 has hastened the development of the creation of a regulatory framework for geoscientists in Ontario. The Association of Geoscientists of Ontario, with the assistance of the Ministry of Northern Development and Mines, successfully passed legislation for an Association of Professional Geoscientists of Ontario (APGO) in 2000. The Minister of Northern Development and Mines approved final regulations and association bylaws in 2001. This new self-regulating organization will act to set standards for the practice of geoscience and regulate practitioners in the province. The APGO released registration packages to the public in December of 2001. The APGO maintains a website (www.geosci.on.ca) where information about the organization and membership can be obtained.

For those interested in obtaining printed versions of National Instrument 43-101, the Ontario Securities Commission (OSC) has published the National Instrument, its Companion Policy and Form in chapter 5 of the January issue of the OSC Bulletin. The documents are also published in the Ontario Gazette of January 20, 2001 and available electronically at www.osc.gov.on.ca/en/Regulation/Rulemaking/Rules/noticeRule_43101.pdf

Regulation of Reporting of Mineral Projects by Mining Analysts

The Securities Industry Committee on Analyst Standards (SICAS) was established by the Investment Dealers Association, the Toronto Stock Exchange (TSE) and Canadian Venture Exchange (CDNX) in September 1999, as an initial step in responding to concerns raised about the role that analysts play in promoting stocks in the marketplace. The SICAS Committee is studying the role of the Mining Analyst as a source of information for an investor and how the analyst's role can be best clarified to enhance an investor's decisions.

The SICAS Committee released its final report entitled 'Setting Analyst Standards' in November 2001. It is available on the Toronto Stock Exchange (TSE) website for public review at:
(http://www.tse.com/cgi-bin/uni_framset.cgi?content%3Dnews/news_rel/news_605.html).

The report contains a number of recommendations, proposed practices and conduct guidelines that will apply to analysts of mineral resources and resource companies. These include:

- 7 recommendations that focus on better disclosure of conflicts of interest;
- 12 recommendations that focus on improving research reports by outlining best practices for design of reports and issuance of reports by analysts and their firms;
- 6 recommendations that focus on the registration of supervisory analysts and the oversight of all analysts in the marketplace; and
- 7 recommendations that focus on the importance of good governance as well as additional recommendations for the marketplace and investors in general.

Universal Market Integrity (UMI) Rules

In 2001, The Ontario Securities Commission released a Discussion Paper on proposed market integrity rules to be applied by all securities commissions and exchanges. TSE Regulation Services and the CDNX have developed market integrity rules based on the "framework" or core trading rules put forward in the Canadian Securities Administrators (CSA) Proposal for Regulating Alternative Trading Systems. This initiative is partly in response to the possible future evolution of electronic exchanges and other forms of securities exchanges that may cater to specialized venture capital niches.

TSE Regulatory Services Inc. and CDNX will apply as market regulators for domestic equity markets and have proposed that the UMI rules apply to trading "of all types of securities traded on all exchanges and Automated Trading Systems". One example of this type of exchange could be the proposed Canadian Trading and Quotation System (CNQ) that expects to create a trading platform for currently unlisted Canadian companies, many of which are mineral explorers.

The final rule and companion policy governing Universal Market Integrity can be reviewed at www.osc.gov.on.ca/en/Regulation/Rulemaking/Rules/011102_alternative_trading_systems.pdf.

OSC Rule 45-501, Exempt Distributions

In June 1999, an MMIC client forwarded a concept paper to the ILG from the OSC that proposed changing several of the rules concerning how small and medium capital enterprises (SME) raise capital. There are currently four exemptions, unmodified since 1980, being considered for replacement by two new exemptions. The four to be replaced are:

- the private company exemption;
- the \$150 000 exemption;
- the seed capital exemption; and
- the government incentive security exemption.

The new proposed exemptions are:

- the Closely Held Issuer Exemption; and
- the Accredited Investor Exemption.

The new exemptions were intended to provide streamlining for the small company (including most junior mining companies) issuing shares, mainly as private placements, raising capital. It will also raise the caps on these financings to higher limits than currently exist (up to \$3 million) and in some cases widen the number of possible investors. Response was very sparse to this concept paper in 1999.

On September 8th, 2000 the Ontario Securities Commission released a revised document: *Proposed Rule 45-101 - Exempt Distributions* via its web site, requesting comments on the Proposal by interested members of the public before December 8th, 2000. On April 6th, 2001 the Ontario Securities Commission released a revised document for one last comment period before installing the new Rule. At this time, the mining sector responded strongly.

The Prospectors and Developers Association of Canada provided comments on the proposed changes to Exempt Distributions on May 7th, 2001. The PDAC submitted that the proposal to eliminate the government incentive security exemption was of primary concern for their membership. Under the proposed rule, only accredited investors (a very small percentage of investors) will be permitted to acquire flow-through shares on an exempt basis. The definition of accredited investor under the proposed changes would require the person have assets of \$1 million or pre-tax income of \$200 000 or more. The PDAC has pointed out that, by eradicating the exemption for all issuers, the OSC would be inhibiting the ability of exploration company issuers to take full advantage of the newly developed super flow-through share program implemented by the Federal and Ontario governments. The final rule was issued in November 2001, and effectively protects the government exemption that makes flow-through financings available through private placements to small investors. The final Rule can be viewed at http://www.osc.gov.on.ca/en/Regulation/Rulemaking/Rules/45-501_011123.pdf

INDUSTRY LIAISON GEOLOGIST INFORMATION ACTIVITIES – INDUSTRY SUPPORT

The MMIC receives numerous requests during the year for industry related information to assist with the execution of exploration projects or the delivery of information products for government or industry partners. Several research activities undertaken at the request of MMIC clients are as follows.

Mineral Exploration Linked to Forest Access Infrastructure

In July, a request was made to MNDM to provide information on mineral exploration and development issues linked to forest access roads. The Ontario Prospectors Association referred the request to the Mines and Minerals Information Centre. The purpose of the request was to develop a set of demonstration maps and supporting experiential or anecdotal information showing how mineral development, as one of many activities in forest management areas, benefits from access created by the forest industry. Information made available in response to the request included mining claim fabric for selected regions in the Kenora, Thunder Bay, Sudbury and Hearst Forest Management districts. When combined with the local forest road network these maps provide an efficient means to illustrate the current relevance of forest road access to the exploration community.

Resident Geologist Program staff also provided anecdotal information about exploration successes related to forest access roads. The following text represents a selection of the contributions received, compiled and edited by the ILG.

WAWA AREA

In the summer of 1996, Wawa prospector Terry Nicholson and partner Gus Gratton located a sulphide occurrence along a recently constructed logging road, on the boundary between Meath and West townships, 10 km from the Renabie Mine road. The property was eventually optioned to Freewest Resources who conducted gold exploration work in 1998. The area was a recommended gold exploration target by the Ontario Resident Geologist Program's Sault Ste. Marie office in 2000.

CanAlaska Ventures Ltd. reported that a kimberlite sampling program would commence shortly on the Wawa Diamond Project (2000), situated 55 km north east of Wawa, Ontario. The property was acquired from the vendors following the discovery of kimberlite boulders and kimberlitic dykes in outcrop exposed along a newly constructed logging road. A single 47 kg composite sample composed of kimberlitic material taken along the roadside was sent for caustic fusion analysis and resulted in the recovery of a macrodiamond measuring 1.64 mm x 1.55 mm x 0.62 mm.

Band-Ore Resources Ltd. announced in 2000 that it had entered into an agreement to acquire a private Ontario Company which holds a 100% interest in a new bedrock diamond discovery. The 25 square kilometre property is located in the southwest corner of Musquash Township, approximately 15 km north of Wawa. The original vendors, Michael Tremblay, Terry Nicholson and Jacques Robert, discovered several outcrops and large "truck sized" angular boulders of fragmental lamprophyric, kimberlite-like material uncovered by several brand new logging roads. Two samples of this material were collected from outcrop and submitted for caustic fusion processing and microdiamond recovery to the laboratories of Kennecott Canada Exploration in Thunder Bay, Ontario. According to Kennecott's report, a 63.4 kg sample yielded a total of 45 diamonds, 10 of which were macrodiamonds (diamonds with one dimension measuring greater than 0.5 mm).

THUNDER BAY AREA

There are many discoveries in the Thunder Bay area that have resulted directly from construction of recent forest access roads. Some are older, forgotten occurrences that have been rediscovered after logging operations provided new access for prospectors to the area. Others are new discoveries in areas where access has never been previously established. Some examples include:

- Gionet platinum group element-copper-nickel showings east of Manitouwadge;
- Echo Lake Amethyst Quarry in Marks Township and the Thunder Bay Agate Mine;
- Armstrong area PGE and rare metal properties of Linear Resources, Emerald Fields Resources and Murgor Resources; and
- The area around Moss Lake, dormant for almost 60 years after the Moss Mine closed in the mid-1930s. Great Lakes Paper, now Bowater, started logging operations which provided renewed access for prospecting. Many new occurrences were discovered by Pele Mountain Resources, Tandem Resources at Snodgrass Lake, by prospectors Costy Bumbu, Mike Fogen and others. The main exploration thrust was for copper, gold, and silver, but molybdenum and zinc were also found. (Note: the 60-year cycle relates to the forest harvest cycle.)
- Quite recently, the establishment of logging roads and related harvest operations has resulted in high-grade boulders of volcanogenic massive sulphide type mineralization being discovered in Aldina Township. The new discoveries redirected the exploration efforts of RJK Explorations Limited. Recently, logging contractors assisted RJK in this project. Firesteel Contracting shifted their logging plan to an area where RJK was looking for timely geological information, leading to the discovery of in-situ sphalerite (zinc) mineralization.

KENORA - RED LAKE AREA

The Red Lake Regional Resident Geologist Reports of Activities for 1998 and 1999 illustrate several areas of pegmatite sampling along recent forest access roads and in 2000, much of the area around Root Lake was staked for rare metal pegmatite potential. Near Red Lake, some examples of exploration access via logging roads are:

- The base metal occurrences southwest of the South Bay Mine that have been extensively explored by Noranda Ltd. (Belanger, Knott, Mitchell and Bowerman townships, the South of Otter Lake area, Fredart Lake area, Gerry Lake area and Karas Lake area);
- The Dixie Lake gold and base metal properties most recently worked by Canadian Golden Dragon Resources circa 1996; and
- The Trout Bay platinum group element property of Goldcorp Inc.

Near Kenora there are also many examples of mineral exploration taking advantage of forestry access roads:

- The Separation Rapids pegmatite field (Avalon Ventures - Big Whopper; Emerald Fields - Big Mack; Tanco - Marko pegmatite);
- The Treelined Lake graphite occurrence; and
- The Forgotten Lake granite quarry (Nelson Granite, in production).

Aboriginal Communities and Minerals and Metals Activities Maps

Natural Resources Canada (NRCan) has been developing maps identifying mineral operations and aboriginal communities on a province by province basis. The purpose of these maps is to look at the proximity of mineral development and production projects relative to aboriginal communities for possible evaluation of future employment and business opportunities. NRCan's policy group is developing the maps. In October 2000, the ILG collated producing mine information, verified by the Resident Geologist Program for NRCan. In early 2001, NRCan published a preliminary version of this map for Ontario entitled 'Ontario Aboriginal Communities and Minerals and Metals Activities'. In February, staff at the MMIC was requested to verify a list of 18 projects considered by NRCan to be at the deposit appraisal stage in Ontario for the same map project. These operations will be included in a future version of the publication. The deposit appraisal stage can be summarily defined as follows:

DEPOSIT APPRAISAL expenditures represent all field activities, capital, repair and maintenance expenditures, carried out (on- or off-mine-site) to bring a delineated deposit to the stage of having the detailed knowledge required for a production feasibility study to support a production decision and the investment required.

More information about mineral exploration and development expenditures in Ontario and other Canadian mining jurisdictions, including the definitions of work stages used for collecting this information are available electronically at www.nrcan.gc.ca/mms/efab/mmsd/exploration/default.html.

New Field Season Safety and Operations Information

At the request of the Ontario Prospectors Association, the ILG submitted an article for use in the March 2001 issue of the Explorationist newsletter. The article provided Internet links to information requested by clients or that staff at the MMIC had identified as information of use to people operating field projects in Ontario.

Magnetic and spatial coordinate conversion utilities are a popular request. Natural Resources Canada provides a calculator for magnetic declination (www.geolab.emr.ca/geomag/e_cgrf.html) and software for lat./long. and UTM conversions at www.geod.nrcan.gc.ca/site/index_e/products_e/software_e/gsrug_e/gsrug_e.html.

Safety considerations are another area where clients often seek information. Provincial and federal guidelines are readily available online as are other formally recognized providers of safety training and information. First aid/CPR information is available through the St. John's Ambulance web page (<http://www.sja.ca/english/offices>) for information about general or industry specific courses, as well as ideas for first aid kits.

Boating regulations have been amended and are being more stringently enforced over the past year. Rules for safe boating operations for all types of watercraft can be accessed by visiting the Canadian Coast Guard site at www.ccg-gcc.gc.ca/obs-bsn/sbg-gsn/operator_e.htm.

Drinking water guidelines have been under review in several Ontario government ministries, in particular the Ministry of the Environment and the Ministry of Labour. Some members of the exploration sector, such as drilling companies represented by the Canadian Drillers Association, have already moved to meet anticipated changes to water supply quality guidelines in their field operations.

New and more comprehensive drinking water guidelines continue to be developed for the Province. The most current regulations about drinking water quality and the operation of water treatment or distribution systems are O. Reg. 459/00 and O. Reg. 505/01, which can be viewed at Ontario's E-Laws website at <http://www.e-laws.gov.on.ca>. Although these regulations appear to exempt operations of the size of a small exploration camp, they do not appear to address the situation of a camp set up by an employer for employees. Other rules such as Reg. O. 601/91 of the Health Protection and Promotion Act, dealing with Camps in Unorganized Territory, could apply as could Ministry of Labour (MOL) regulations that consider exploration camps to be mining operations. Checking with the MOL and MOE is recommended when planning to supply a field operation from surface waters near a camp.

Water-borne parasites and illnesses are well documented on the web. Health Canada provides information on

"beaver fever" at <http://www.hc-sc.gc.ca/ehp/ehd/catalogue/general/iyh/giardia.htm>. Young people reaching grade 7 in Ontario are now receiving Hepatitis A vaccines at school. These vaccines are an inexpensive protection to consider against a widespread illness. Explorationists, particularly those who travel internationally, should consult their doctor regarding inoculation.

People working in remote areas should also be aware of the new responsibilities that come with having firearms available for camp safety. There are provisions in the new Firearms Act for remote site gun storage and access in case of incursions by bears, etc. Still, camp organizers should check with camp inhabitants as to the licensing of their personal weapons and define access rules for the "bear gun". The Firearms Act is found at www.cfc-ccaf.gc.ca/legal/pdf/act-en.pdf and the regulations at <http://www.cfc-ccaf.gc.ca/legal/pdf/regulations.pdf>. Direct advice from the Chief Firearms Officer for Ontario (Ontario Provincial Police) can be obtained by calling 1 800 731 4000 and the CFO strongly encourages gun users to make information inquiries to his office.

The Ontario Prospectors Association and local Prospector and Developer Associations affiliates around Ontario offer explosives/blasting workshops at the regional meetings, as demand requires. Explosives are a federally regulated activity and Natural Resources Canada offers information about explosives at www.nrcan.gc.ca/mms/explosif/ as well as details about certification and manuals for safe handling.

The MNDM has also made some amendments to the Ontario Mining Act R.S.O.1990 that change how mining claims are re-opened for staking. These amendments took effect December 26, 2000 and can affect the legal opening day of an expired claim. Staking or re-staking expired claims will require the ability to communicate with a Mining Lands Consultant in the event that Internet access is unavailable to ensure that the land has been re-opened. These changes can be seen at www.mndm.gov.on.ca/MNDM/MINES/LANDS/bulbrd/infbl2e.htm.

The MNDM has also placed recent changes to advanced exploration status on the Internet. Those planning large areas of stripping or stripping work near water within the context of Advanced Exploration should review the Mines Group web page at <http://www.mndm.gov.on.ca/MNDM/MINES/MG/ADVEX/advdef.htm>.

ACKNOWLEDGEMENTS

The authors gratefully acknowledge the insights and efforts of the clients of the Mines and Minerals Information Centre who shared their observations with staff in order to improve services provided at the MMIC and other MNDM offices. Such interactions assist in building the broad-based knowledge resource required by MNDM staff to enhance mineral sector competitiveness and ensure the sustainable development of Ontario's mineral resources. The authors also recognize and deeply appreciate the efforts of Jennifer John, Ken Steele, Lindsay Hall and Max Barua for their support and assistance in delivering program services and client support activities at the MMIC during the past year.

In addition, after serving in the Ontario Public Service for 34 years, all with "Mines" in Toronto, Jennifer John is retiring in February 2002. Jennifer started with the Ontario Department of Mines, Geological Surveys section in 1968. In her early years in the OPS, she corrected and edited reports written by Precambrian Section geologists. Rumor has it that Jennifer was the only one, including Nancy, who could read Phil Thurston's handwriting.

Later she moved on to a long association with the Phanerozoic Geology and Engineering & Terrain Geology groups. Jennifer also worked with the Southern Ontario Regional Office and Relocation Office teams in the early 90's. Since 1992, Jennifer has been a mainstay at MMIC, helping clients and staff with a smiling face and advice couched in her long experience. We hope she takes our warm wishes, sincerest thanks and many happy memories along with her as she explores new opportunities.

MINES AND MINERALS INFORMATION CENTRE – 2001

Table 1. Newsletters received by MMIC Library in 2001.

Title
Alaska GeoSurvey News – Newsletter, Alaska Division of Geological & Geophysical Surveys
AusGeo News – Australian Geological Survey Organization
Bearsh't & Blueberries – North-western Ontario Prospectors Association
Canadian Copper – Canadian Copper & Brass Development Association
CANQUA Newsletter – Canadian Quaternary Association
Explore – Newsletter for the Association of Exploration Geochemists
GEOLOG – News Magazine of the Geological Association of Canada
ICME Newsletter – International Council on Metals and the Environment
ICMM Newsletter – International Council on Mining and Metals
Iowa Geology – Iowa Department of Natural Resources
Lunar and Planetary Information Bulletin – Lunar and Planetary Institute
Mineralogical Association of Canada Newsletter
Mining Matters & Mining in Ontario – Ontario Mining Association
Nevada Geolog – Newsletter of the Nevada Bureau of Mines and Geology
Newsletter – Environmental Earth Sciences Division, GAC
Newsletter – International Liaison Group on Gold Mineralization
Nova Scotia Minerals Update – Nova Scotia Natural Resources
Ohio Geology – Ohio Department of Natural Resources
Outlook – Missouri Department of Natural Resources
PDAC in Brief – Prospectors and Developers Association of Canada
R & D – Research and Development at the Alberta Research Council
Rock Chips – Alberta Geological Survey
Safety Focus – Mines and Aggregates Safety and Health Association
The Explorationist – Newsletter of the Ontario Prospectors Association
The Geologic Record – Kansas Geological Survey
Washington Geology – Washington State Department of Natural Resources
Wat on Earth – University of Waterloo Department of Earth Sciences

Table 2. Journals and periodicals received by MMIC Library in 2001.

Title
Aggregates & Roadbuilding
Canadian Journal of Earth Sciences
Canadian Mining Journal
Canadian Mining and Metallurgical Bulletin – Canadian Institute of Mining, Metallurgy and Petroleum
Economic Geology – Bulletin of the Society of Economic Geologists
Engineering and Mining Journal
Exploration and Mining Geology – Journal of the Geological Society of CIM
Géographie Physique et Quatenaire
Geoscience Canada
Geotimes – News and Trends in Geoscience – American Geological Institute
Industrial Minerals
Journal of Geochemical Exploration – Elsevier
Mineralogical Association of Canada – The Canadian Mineralogist
Mining and Exploration Company Financings – Gamah International Limited
Mining Journal
Mining Magazine
Mining Review – British Columbia and Yukon Chamber of Mines
Mining Voice – National Mining Association
North American Minerals News – Industrial Minerals Markets of USA, Canada, Mexico and the Caribbean
Northern Miner
Northern Ontario Business
Provincial Geologists Journal – Committee of Provincial Geologists
The Ontario Prospector

Table 3. New reference publications received by the MMIC Library in 2001.

Title	Author	Type and Year of Publication
Tectonic Evolution of Southeast Asia	Hall, R. and Blundell, D.J. (eds.)	Geological Society Special Publication No. 106, The Geological Society, London, 566p., 1966
Canadian Mining Journal: 2001 Mining Sourcebook	Scales, M. (ed.)	110 th Edition, Southam Magazine Group, Toronto, 154p., 2001
Ontario Mining & Exploration Directory 2001	Hannay, M. (ed.)	Directory, Naylor Publications Company (Canada), Winnipeg, 54p., 2001
1999 Canadian Minerals Yearbook: Review and Outlook	Godin, E. (ed.)	Minerals and Metals Sector, Natural Resources Canada, Ottawa, 2001
Tectonic and Magmatic Processes in Crustal Growth: A Pan-LITHOPROBE Perspective	Percival, J., Heaman, L., Rivers, T. and Skulski, T. (convenors)	Lithoprobe Report #75, 143p., 1999
Environmental Considerations of Active and Abandoned Mine Lands: Lessons from Summitville, Colorado	King, T.V.V. (ed.)	U.S. Geological Survey Bulletin 2220, Denver CO, 38p., 1995
Fraser Institute Annual Survey of Mining Companies 2000 / 2001	McCahon, K. (ed.)	Fraser Institute Survey, Vancouver, 50p., 2001
Overview of Trends in Canadian Mineral Exploration	Natural Resources Canada	Report, Intergovernmental Working Group on the Mineral Industry (IGWG), Ottawa, 121p., 2000
Metal Mining and the Environment	Hudson, T.L., Fox, F.D. and Plumlee, G.S.	AGI Environmental Awareness Series, 3, Alexandria Virginia, 64p., 1999
Your Guide to Government of Canada Services and Support for Small Business	Government of Canada	Guide, 3 rd Edition, Industry Portfolio Office, Ottawa, 119p., 2000
Guide des services et des programmes du gouvernement du Canada à l'intention de la petite entreprise	Gouvernement du Canada	Guide, 3 ^e édition, Bureau du Portefeuille de l'Industrie, Ottawa, 119p., 2000
Mineral Industry Info-Guide	Natural Resources Canada	Info-Guide, Minerals and Metals Sector, Ottawa, 108p., 2000
Guide to the Inuvialuit Settlement Region for Mineral Prospectors and Developers	Indian and Northern Affairs Canada	Inuvialuit Regional Corporation, Inuvik NT, 105p., 2000
Platinum 2001	Cowley, A. and Steel, M.	Platinum report, Johnson Matthey Public Limited Company, London England, 52p., 2001
Production et investissements de l'industrie minière du Québec 2000	Leger, J-G	Statistiques, Ministère des Ressources naturelles, Québec, 41p., 2001
Operation Superior: Compilation of Kimberlite Indicator Mineral Survey Results (1996-2000)	Fedikow, E., Nielsen, E., Conley, G.G. and Lenton, P.G.	Manitoba Industry, Trade and Mines, Geological survey, Open File Report OF2001-4, 60p., 2001
Canadian Mining Taxation 2001 Edition	New, G. (ed.)	PricewaterhouseCoopers Booklet, Toronto, 48p., 2000
Financial Reporting in the Mining Industry for the 21 st Century		PricewaterhouseCoopers, Vancouver, 136p., 1999
Mining in Argentina		PricewaterhouseCoopers, 44p., 2001
Canadian Mines Handbook 2001-02	Giancola, D. (ed.)	Southam Mining Group, Toronto, 544p., 2001
2001/02 CAMESE Compendium of Canadian Mining Suppliers	Baird, J.G., Director	The Canadian Association of Mining Equipment and Services for Export, Markham Ontario, 178p., 2001
Manitoba Annual Report 2000 - 2001	Ministry of Industry, Trade and Mines	Manitoba Annual Report, Winnipeg, 116p., 2001

Title	Author	Type and Year of Publication
Platinim 2001 Interim Review	Cowley, A. and Hankin, D.	Platinum Review, Johnson Matthey, London England, 28p., 2001
Alaska's Mineral Industry 1999	Swainbank, R.C., Szumigala, D.J., Henning, M.W. and Pillifant, F.M.	Special Report 54, Alaska Division of Geological & Geophysical Surveys, Fairbanks, 73p., 1999
Alaska's Mineral Industry 2000: A Summary	Szumigala, D.J. and Swainbank, R.C.	Information Circular 47, Alaska Division of Geological & Geophysical Surveys, Fairbanks, 14p., 2001
Opportunities in Western China	China and Mongolia Division	Department of Foreign Affairs and International Trade, Ottawa, 57p., 2001
Report of the Mining Health and Safety Program for 1999	Operations Division - Provincial Mining Coordinator's Office	Report, Occupational Health & Safety Branch, Ministry of Labour, Sudbury, 179p., 2001
Minerals and Metals: Towards a Sustainable Future	Natural Resources Canada	Monograph No.10, Minerals and Metals Sector, Natural Resources Canada, Ottawa, 18p., 2000
L'industrie des minéraux et des métaux : Vers un avenir durable	Ressources naturelles Canada	Monographie n°10, Secteur des minéraux et des métaux, Ressources naturelles Canada, Ottawa, 18p., 2000
Progress Report 2000 Mines and Minerals Division	Mines and Minerals Division	Progress Report, Mines and Minerals Division, MNDM, Sudbury, 70p., 2001
Facts and Figures 2000	The Mining Association of Canada	Facts and Figures, The Mining Association of Canada, Ottawa, 64p., 2001
Faits et chiffres 2000	L'Association minière du Canada	Faits et chiffres, L'Association minière du Canada, Ottawa, 64p., 2001
International Geological Correlation Programme Geoscience in the Service of Society (IGCP)	Gower, C.F.	Canada Newsletter 27, Geological Survey of Newfoundland and Labrador, St. John's, 53p., 2001
"Stone to Steel - following dolomite from the quarry through the steel making process"	Steele, K. and Borland, J.	Field Trip, CIM Toronto Branch, CIM Industrial Minerals Division, Ontario Ministry of Northern Development and Mines, Toronto, 24p., 2001
Bats and Mines	Tuttle, M.D. and Taylor, D.A.R.	Resource Publication No.3, Bat Conservation International, Inc., Austin TX, 50p., 1998
Superior PGE 2001	CIM Thunder Bay Branch	Field Conferences, CIM Geological Society, Thunder Bay, 1v., 2001
Ontario Exploration	Ellis, R. (ed.)	Special Supplement, The Mining Journal Ltd., London, 52p., 2001

MINES AND MINERALS INFORMATION CENTRE – 2001

Table 4. Ontario Geological Survey publications received by MMIC Library in 2001.

Title	Author	Type and Year of Publication
Geology, Metamorphism and Geochemistry of Rocks of the Southern and Grenville Provinces in the Vicinity of the Grenville Front, Timmins Creek Area, near Sudbury, Ontario	Murphy, E.I.	Ontario Geological Survey, Open File Report 6041, 132p., 2001. Accompanied by map P.3428
Precambrian Geology of the Timmins Creek Area, Street Township	Murphy, E.I.	Ontario Geological Survey, Preliminary Map P.3428, scale 1:4000, 2001
Precambrian Geology of the Stables Lake Area	Stone, D., Hallé, J. and Lange, M.	Ontario Geological Survey, Preliminary Map P.3429, scale 1:50 000, 2001
Precambrian Geology of the Blackbear Lake Area	Stone, D., Hallé, J. and Petersen, N.	Ontario Geological Survey, Preliminary Map P.3430, scale 1:50 000, 2001
Precambrian Geology of the Igelstrom Lake Area	Stone, D., Hallé, J. and Petersen, N.	Ontario Geological Survey, Preliminary Map P.3431, scale 1:50 000, 2001
Peterlong Lake-Radiasson Lake Area High Density Lake Sediment Survey: Gold and PGE Data – Operation Treasure Hunt	Ontario Geological Survey	Ontario Geological Survey, Open File Report 6053†, 46p., 2001
Precambrian Geology Compilation Series—Quetico Sheet	Santaguida, F.	Ontario Geological Survey, Map 2663, scale 1:250 000, 2001
Geology of the North Caribou Lake Area, Northwestern Ontario	Breaks, F.W., Osmani, I.A. and deKemp, E.A.	Ontario Geological Survey, Open File Report 6023, 82p., 2001
Precambrian Geology of the Watabeag Lake Area	Vaillancourt, C.	Ontario Geological Survey, Open File Report 6042, 61p., 2001
Structural Geology of the Holloway Mine, Abitibi Greenstone Belt, Ontario	Luinstra, B. and Benn, K.	Ontario Geological Survey, Open File Report 6045, 36p., 2001
Precambrian Geology, Crerar Township	Easton, R.M. and Hrominchuk, J.L.	Ontario Geological Survey, Preliminary Map P.3432, scale 1:20 000, 2001
Precambrian Geology, Dana Township	Easton, R.M. and Hrominchuk, J.L.	Ontario Geological Survey, Preliminary Map P.3433, scale 1:20 000, 2001
Precambrian Geology, Heaven Lake Greenstone Belt, Northwestern Ontario	Hart, T.R., MacDonald, C.A.K. and Lepine, C.D.	Ontario Geological Survey, Preliminary Map P.3434, scale 1:20 000, 2001
Precambrian Geology, Lac des Iles Greenstone Belt, Northwestern Ontario	Hart, T.R., MacDonald, C.A.K. and Lepine, C.D.	Ontario Geological Survey, Preliminary Map P.3435, scale 1:20 000, 2001
Precambrian Geology, Timmins West—Bristol and Ogden Townships	Vaillancourt, C., Pickett, C.L. and Diné, E.	Ontario Geological Survey, Preliminary Map P.3436, scale 1:20 000, 2001
Results of Regional Till Sampling for Kimberlite and Base Metal Indicator Minerals, Shebandowan Greenstone Belt, Northwestern Ontario	Bajc, A.F. and Crabtree, D.C.	Ontario Geological Survey, Open File Report 6046†, 64p., 2001
Report of Activities 2000, Resident Geologist Program, Red Lake Regional Resident Geologist Report: Red Lake and Kenora Districts	Lichtblau, A., Raoul, A., Ravnaas, C., Storey, C.C., Kosloski, L., Debicki, R. and Drost, A.	Ontario Geological Survey, Open File Report 6047, 109p., 2001
Report of Activities 2000, Resident Geologist Program, Thunder Bay North Regional Resident Geologist Report: Thunder Bay North District	Mason, J.K., White, G.D., O'Brien, M.S., Komar, C., Stewart, J., Debicki, R. and Drost, A.	Ontario Geological Survey, Open File Report 6048, 56p., 2001
Report of Activities 2000, Resident Geologist Program, Thunder Bay South Regional Resident Geologist Report: Thunder Bay South District	Schnieders, B.R., Scott, J.F., Smyk, M.C., O'Brien, M.S., Debicki, R. and Drost, A.	Ontario Geological Survey, Open File Report 6049, 64p., 2001
Report of Activities 2000, Resident Geologist Program, Timmins Regional Resident Geologist Report: Timmins and Sault Ste. Marie Districts	Atkinson, B.T., Hailstone, M., Seim, G.Wm., Wilson, A.C., Draper, D.M., Farrow, D., Hope, P., Debicki, R. and Yule, G.	Ontario Geological Survey, Open File Report 6050, 116p., 2001

Title	Author	Type and Year of Publication
Report of Activities 2000, Resident Geologist Program, Kirkland Lake Regional Resident Geologist Report: Kirkland Lake and Sudbury Districts	Meyer, G., Cosc, M., Grabowski, G.P.B., Guindon, D.L., Hailstone, M., Stephenson, C., Wallace, L.M., Debicki, R. and Yule, G.	Ontario Geological Survey, Open File Report 6051, 113p., 2001
Report of Activities 2000, Resident Geologist Program, Southern Ontario Regional Resident Geologist Report: Southeastern and Southwestern Districts, Mines and Minerals Informatic Centre, and Petroleum Resources Centre	Sangster, P.J., McGuinty, W.J., Papertzian, V.C., Steele, K.G., Lee, C.R., Laidlaw, D.A., Carter, T.R., Spears, G.J., Debicki, R. and Rowell, D.	Ontario Geological Survey, Open File Report 6052, 108p., 2001
Precambrian Geology Compilation Series—Thunder Bay Sheet	Santaguida, F.	Ontario Geological Survey, Map 2664, scale 1:250 000, 2001
Preliminary Geological Investigation of Dorothea and Sandra Townships: Evaluating Potential for Structurally Hosted Mesothermal Gold Mineralization	DeWolfe, J.C.	Ontario Geological Survey, Open File Report 6059, 16p., 2001
Precambrian Geology, Garden Lake Greenstone Belt (West Half)	Hart, T.R.	Ontario Geological Survey, Preliminary Map P.3422—Revised, scale 1:20 000, 2001
Precambrian Geology, Garden Lake Greenstone Belt (East Half)	Hart, T.R.	Ontario Geological Survey, Preliminary Map P.3423—Revised, scale 1:20 000, 2001
Preliminary Data Results of Drift Exploration for Platinum Group Elements, Northwestern Ontario	Searcy, C.A.	Ontario Geological Survey, Open File Report 6054f, 271 p., 2001
Geochemical and Till Pebble Lithology Data, Surficial Sediment Sampling Program, Schreiber—Killala Lake Area, Northwestern Ontario	Morris, T.F.	Ontario Geological Survey, Open File Report 6056f, 62p., 2001
Shebandowan Area High Density Regional Lake Sediment and Water Geochemical Survey, Northwestern Ontario	Jackson, J.E.	Ontario Geological Survey, Open File Report 6057f, 83p., 2001
Results of Modern Alluvium Sampling, Kapuskasing—Fraserdale Area, Northeastern Ontario: Operation Treasure—Kapuskasing Structural Zone	Ontario Geological Survey	Ontario Geological Survey, Open File Report 6044f, 146p., 2001
Precambrian Geology, Wicklow Area	Breaks, F.W. and Thivierge, R.H.	Ontario Geological Survey, Report 288, 107p., 2001. Accompanied by Map 2550
Precambrian Geology, Wicklow Area	Breaks, F.W. and Thivierge, R.H.	Ontario Geological Survey, Map 2550, scale 1:20 000, 2001
Precambrian Geology, Elzevir Area (North Half)	Di Prisco, G., Hammar, J. and Easton, R.M.	Ontario Geological Survey, Preliminary Map P.3180, scale 1:20 000, 2001
Precambrian Geology, Elzevir Area (South Half)	Di Prisco, G., Hammar, J. and Easton, R.M.	Ontario Geological Survey, Preliminary Map P.3181, scale 1:20 000, 2001
Precambrian Geology, Minden Area	Easton, R.M.	Ontario Geological Survey, Preliminary Map P.3415, scale 1:50 000, 2001
Precambrian Geology, Haliburton Area	Easton, R.M.	Ontario Geological Survey, Preliminary Map P.3416, scale 1:50 000, 2001
Regional Modern Alluvium Sampling Survey of the Temagami—Marten River Area, Northeastern Ontario	Allan, S.E.	Ontario Geological Survey, Open File Report 6043f, 194p., 2001
Quaternary Geology of the Wawa Area, Northeastern Ontario	Morris, T.F.	Ontario Geological Survey, Open File Report 6055f, 67p., 2001. Accompanied by Maps 2573 and 2574
Quaternary Geology, Franz-Manitowik Lake-Kinniwabi Lake Area	Morris, T.F.	Ontario Geological Survey, Map 2573, scale 1:50 000, 2001
Quaternary Geology, Head Junction-Michipicoten River Area	Morris, T.F.	Ontario Geological Survey, Map 2574, scale 1:50 000, 2001
Ontario Geological Survey 2000. Airborne magnetic and electromagnetic surveys, residual magnetic field and electromagnetic anomalies, Garden-Obonga area	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 82 124 - 82 130, scale 1:50 000, 2000

Title	Author	Type and Year of Publication
Ontario Geological Survey 2000. Airborne magnetic and electromagnetic surveys, shaded image of the second vertical derivative of the magnetic field and Keating coefficients, Garden-Obonga area	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 82 131 - 82 137, scale 1:50 000, 2000
Ontario Geological Survey 2000. Airborne magnetic and electromagnetic surveys, apparent resistivity and electromagnetic anomalies, Garden-Obonga area	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 82 138 - 82 144, scale 1:50 000, 2000
Ontario Geological Survey 2000. Airborne magnetic and electromagnetic surveys, residual magnetic field and electromagnetic anomalies, Schreiber area	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 82 084 - 82 087, scale 1:50 000, 2000
Ontario Geological Survey 2000. Airborne magnetic and electromagnetic surveys, shaded image of the second vertical derivative of the magnetic field and Keating coefficients, Schreiber area	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 82 088 - 82 091, scale 1:50 000, 2000
Ontario Geological Survey 2000. Airborne magnetic and electromagnetic surveys, apparent resistivity and electromagnetic anomalies, Schreiber area	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 82 092 - 82 095, scale 1:50 000, 2000
Ontario Geological Survey 2000. Airborne magnetic and electromagnetic surveys, residual magnetic field and electromagnetic anomalies, Vickers area	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 82 150, scale 1:50 000, 2000
Ontario Geological Survey 2000. Airborne magnetic and electromagnetic surveys, shaded image of the second vertical derivative of the magnetic field and Keating coefficients, Vickers area	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 82 151, scale 1:50 000, 2000
Ontario Geological Survey 2000. Airborne magnetic and electromagnetic surveys, apparent resistivity and electromagnetic anomalies, Vickers area	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 82 152, scale 1:50 000, 2000
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, total magnetic field and electromagnetic anomalies, Docker area—Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 006, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, second vertical derivative of the magnetic field and electromagnetic anomalies, Docker area—Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 007, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, apparent resistivity and electromagnetic anomalies, Docker area—Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 008, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, total magnetic field and electromagnetic anomalies, Gitch Lake area—Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 033, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, first vertical derivative of the magnetic field and electromagnetic anomalies, Gitch Lake area—Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 034, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, apparent resistivity and electromagnetic anomalies, Gitch Lake area—Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 035, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, residual magnetic field and electromagnetic anomalies, Kakagi Lake area—Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 087, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, second vertical derivative of the magnetic field and electromagnetic anomalies, Kakagi Lake area—Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 088, scale 1:50 000, 2001

Title	Author	Type and Year of Publication
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, EM decay constant and electromagnetic anomalies, Kakagi Lake area--Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 089, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, total magnetic field and electromagnetic anomalies, Amyot-Browning area--Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 000, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, first vertical derivative of the magnetic field and electromagnetic anomalies, Amyot-Browning area--Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 001, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, EM decay constant and electromagnetic anomalies, Amyot-Browning area--Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 002, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, residual magnetic field and electromagnetic anomalies, Cobalt area--Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 003, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, first vertical derivative of the magnetic field and electromagnetic anomalies, Cobalt area--Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 004, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, EM decay constant and electromagnetic anomalies, Cobalt area--Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 005, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, total magnetic field and electromagnetic anomalies, Gowan-Evelyn area--Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 009, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, first vertical derivative of the magnetic field and electromagnetic anomalies, Gowan-Evelyn area--Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 010, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, apparent resistivity and electromagnetic anomalies, Gowan-Evelyn area--Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 011, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, residual magnetic field, Temagami South area--Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 090 - 60 091, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, first vertical derivative of the magnetic field, Temagami South area--Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 092 - 60 093, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, EM decay constant, Temagami South area--Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 094 - 60 095, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, total magnetic field, Temiskaming area--Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 096 - 60 099, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, first vertical derivative of the magnetic field, Temiskaming area--Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 100 - 60 103, scale 1:50 000, 2001
Nature, Timing and Significance of Intermediate to Felsic Intrusive Rocks Associated with the Hemlo Greenstone Belt and Implications for the Regional Geological Setting of the Hemlo Gold Deposit	Beakhouse, G.P.	Ontario Geological Survey, Open File Report 6020, 248p., 2001

MINES AND MINERALS INFORMATION CENTRE – 2001

Title	Author	Type and Year of Publication
Bouguer Gravity of the Timmins Area	Ontario Geological Survey	Ontario Geological Survey, Map 81 670, scale 1:100 000, 2001
Vertical Gravity Gradient of the Timmins Area	Ontario Geological Survey	Ontario Geological Survey, Map 81 671, scale 1:100 000, 2001
Precambrian Geology, Denbigh Area	Lumbers, S.B. and Vertolli, V.M.	Ontario Geological Survey, Preliminary Map P.3437, scale 1:50 000, 2001
Results of Regional Till Sampling for Kimberlite and Base Metal Indicator Minerals, Peterlong Lake–Radisson Lake Area, Northeastern Ontario	Bajc, A.F. and Crabtree, D.C.	Ontario Geological Survey, Open File Report 6060†, 65p., 2001
Quaternary Geology of the Kamiskotia Lake Area	Richard, J.A.	Ontario Geological Survey, Map 2656, scale 1:50 000, 2001
Quaternary Geology of the Dana Lake Area	Tucker, C.M. and Richard, J.A.	Ontario Geological Survey, Map 2660, scale 1:50 000, 2001
Montreal River Headwaters Area Lake Sediment Survey, Northern Ontario: Gold and PGE Data—Operation Treasure Hunt	Ontario Geological Survey	Ontario Geological Survey, Open File Report 6061†, 54p., 2001
Shining Tree Area High Density Lake Sediment and Water Geochemical Survey, Northeastern Ontario	Russell, D.F. and Hamilton, S.M.	Ontario Geological Survey, Open File Report 6062†, 76p., 2001
Results of Modern Alluvium Sampling, Chapleau Area, Northeastern Ontario: Operation Treasure Hunt—Kapuskaing Structural Zone	Ontario Geological Survey	Ontario Geological Survey, Open File Report 6063†, 164p., 2001
Geology and Mineral Potential of the Puzzle Lake Area, Central Metasedimentary Belt, Grenville Province	Easton, R.M.	Ontario Geological Survey, Open File Report 6064, 26p., 2001
Precambrian Geology, Bon Echo Provincial Park	Easton, R.M., Ford, F.D., van Haaften, S. and Smedley, J.A.	Ontario Geological Survey, Preliminary Map P.3270-Revised, scale 1:20 000, 2001
Quaternary Geology of the Sinclair Lake Area	Alcock, P.W. and Miller, M.J.	Ontario Geological Survey, Map 2653, scale 1:50 000, 2001
Quaternary Geology of the Pamour Area	Richard, J.A.	Ontario Geological Survey, Map 2655, scale 1:50 000, 2001
Quaternary Geology of the Timmins Area	Tucker, C.M. and Sharpe, D.	Ontario Geological Survey, Map 2662, scale 1:50 000, 2001
Ontario Geological Survey 2000. Airborne magnetic and electromagnetic surveys, residual magnetic field and electromagnetic anomalies, Cochrane area	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 82 007 - 82 009, scale 1:50 000, 2000
Ontario Geological Survey 2000. Airborne magnetic and electromagnetic surveys, shaded image of the second vertical derivative of the magnetic field and Keating coefficients, Cochrane area	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 82 010 - 82 014, scale 1:50 000, 2000
Ontario Geological Survey 2000. Airborne magnetic and electromagnetic surveys, EM decay constant and electromagnetic anomalies, Cochrane area	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 82 013 - 82 015, scale 1:50 000, 2000
Ontario Geological Survey 2000. Airborne magnetic and electromagnetic surveys, residual magnetic field and electromagnetic anomalies, Matheson area	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 82 025, scale 1:50 000, 2000
Ontario Geological Survey 2000. Airborne magnetic and electromagnetic surveys, shaded image of the second vertical derivative of the magnetic field and Keating coefficients, Matheson area	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 82 026, scale 1:50 000, 2000
Ontario Geological Survey 2000. Airborne magnetic and electromagnetic surveys, EM decay constant and electromagnetic anomalies, Matheson area	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 82 027, scale 1:50 000, 2000

Title	Author	Type and Year of Publication
Ontario Geological Survey 2000. Airborne magnetic and electromagnetic surveys, residual magnetic field and electromagnetic anomalies, Kirkland Lake area	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 82 047 - 82 052, scale 1:50 000, 2000
Ontario Geological Survey 2000. Airborne magnetic and electromagnetic surveys, shaded image of the second vertical derivative of the magnetic field and Keating coefficients, Kirkland Lake area	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 82 053 - 82 058, scale 1:50 000, 2000
Ontario Geological Survey 2000. Airborne magnetic and electromagnetic surveys, EM decay constant and electromagnetic anomalies, Kirkland Lake area	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 82 059 - 82 064, scale 1:50 000, 2000
Ontario Geological Survey 2000. Airborne magnetic and electromagnetic surveys, residual magnetic field and electromagnetic anomalies, Temagami area	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 82 070, scale 1:50 000, 2000
Ontario Geological Survey 2000. Airborne magnetic and electromagnetic surveys, shaded image of the second vertical derivative of the magnetic field and Keating coefficients, Temagami area	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 82 071, scale 1:50 000, 2000
Ontario Geological Survey 2000. Airborne magnetic and electromagnetic surveys, EM decay constant and electromagnetic anomalies, Temagami area	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 82 072, scale 1:50 000, 2000
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, total magnetic field, Albany River - James Bay area--Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 045 - 60 065, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, first vertical derivative of the magnetic field and Keating coefficients, Albany River - James Bay area--Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 066 - 60 086, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, residual magnetic field and electromagnetic anomalies, Geco-Manitouwadge area--Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 012 - 60 018, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, second vertical derivative of the magnetic field and Keating coefficients, Geco-Manitouwadge area--Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 019 - 60 025, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, apparent resistivity and electromagnetic anomalies, Geco-Manitouwadge area--Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 026 - 60 032, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, total magnetic field and electromagnetic anomalies, Hemlo area--Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 036 - 60 038, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, second vertical derivative of the magnetic field and Keating coefficients, Hemlo area--Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 039 - 60 041, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, apparent resistivity and electromagnetic anomalies, Hemlo area--Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 042 - 60 044, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, first vertical derivative of the magnetic field and Keating coefficients, Amyot-Browning area--Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 001-Revised, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, first vertical derivative of the magnetic field and Keating coefficients, Cobalt area--Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 004-Revised, scale 1:50 000, 2001

MINES AND MINERALS INFORMATION CENTRE - 2001

Title	Author	Type and Year of Publication
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, second vertical derivative of the magnetic field and Keating coefficients, Docker area--Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 007-Revised, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, first vertical derivative of the magnetic field and Keating coefficients, Gowan-Evelyn area--Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 010-Revised, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, first vertical derivative of the magnetic field and Keating coefficients, Gitch Lake area--Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 034-Revised, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, second vertical derivative of the magnetic field and Keating coefficients, Kakagi Lake area--Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 088-Revised, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, first vertical derivative of the magnetic field and Keating coefficients, Temagami South area--Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 092 - 60 093-Revised, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, first vertical derivative of the magnetic field and Keating coefficients, Temiskaming area--Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 100 - 60 103-Revised, scale 1:50 000, 2001
Ontario Mineral and Exploration Statistics Statistiques minières et d'exploration de l'Ontario 2000	MNDM	Ministry of Northern Development and Mines, Queen's Printer for Ontario, 86p., 2001
Results of Modern Alluvium Sampling, Foleyet Area, Northeastern Ontario: Operation Treasure Hunt--Kapusasing Structural Zone	Ontario Geological Survey	Ontario Geological Survey, Open File Report 6065†, 144p., 2001
Precambrian Geology Compilation Series-Schreiber Sheet	Santaguida, F.	Ontario Geological Survey, Map 2665, scale 1:250 000, 2001
On the Structural Geology of the Southern Province between Sault Ste. Marie and Espanola, Ontario	Jackson, S.L.	Ontario Geological Survey, Open File Report 5995, 55p., 2001
A Study of Indicator Minerals for Kimberlite, Base Metals and Gold: Northern Superior Province of Ontario	Stone, D.	Ontario Geological Survey, Open File Report 6066†, 140p., 2001
Precambrian Geology, Mazinaw Lake Area	Easton, R.M.	Ontario Geological Survey, Preliminary Map P.3439, scale 1:50 000, 2001
Precambrian Geology, Sharbot Lake Area	Easton, R.M.	Ontario Geological Survey, Preliminary Map P.3440, scale 1:50 000, 2001
Precambrian Geology, Kaladar Area	Easton, R.M.	Ontario Geological Survey, Preliminary Map P.3441, scale 1:50 000, 2001
Precambrian Geology, Tichborne Area	Easton, R.M.	Ontario Geological Survey, Preliminary Map P.3442, scale 1:50 000, 2001
A Regional Evaluation of the Shale Resource Potential of the Upper Ordovician Queenston Formation, Southern Ontario	Armstrong, D.K.	Ontario Geological Survey, Open File Report 6058, 148p., 2001
Quaternary Geology, Shining Tree Area	Alcock, P.W. and Miller, M.J.	Ontario Geological Survey, Map 2654, scale 1:50 000, 2001
Geological Survey of Canada / Ontario Geological Survey 2001. First Vertical Derivative of Magnetic Field With Keating Coefficient Map - Kapuskasing-Chapleau area, Ontario	GSC / OGS	GSC / Ontario Geological Survey, Map 81 672 - 81 699, scale 1:50 000, 2001

Title	Author	Type and Year of Publication
Geological Survey of Canada / Ontario Geological Survey 2001. Aeromagnetic Total Field Map - Kapuskasing-Chapleau area, Ontario	GSC / OGS	GSC / Ontario Geological Survey, Map 81 700- 81 727, scale 1:50 000, 2001
Results of Modern Alluvium Sampling, Coral Rapids Area, Northeastern Ontario: Operation Treasure Hunt-Kapuskasing Structural Zone	Ontario Geological Survey	Ontario Geological Survey, Open File Report 6068†, 117p., 2001
Sioux Lookout-Bamaji Lake Area Lake Sediment Survey: Operation Treasure Hunt	Ontario Geological Survey	Ontario Geological Survey, Open File Report 6069†, 115p., 2001
Fort Hope Area High Density Regional Lake Sediment Geochemical Survey, Northwestern Ontario	Ontario Geological Survey	Ontario Geological Survey, Open File Report 6071†, 198p., 2001
Physical Evaluation and Assessment of Bedrock Aggregate Resource Potential, North Shore of Lake Superior	Jagger Hims Limited, Clayton Research Limited and Agritrans Limited	Ontario Geological Survey, Open File Report 6072, 92p., 2001
Stratigraphy of Epiclastic and Volcaniclastic Facies Units, Northern Birch-Uchi Greenstone Belt, Uchi Subprovince	Devaney, J.R.	Ontario Geological Survey, Open File Report 6030, 49p., 2001
Sedimentology and Volcanology of Selected Tectonized Stratigraphic Units, Southern Birch-Uchi Greenstone Belt, Uchi Subprovince	Devaney, J.R.	Ontario Geological Survey, Open File Report 6031, 47p., 2001
A Compilation of References for Kimberlite, Diamond and Related Topics	Sage, R.P. and Gareau, T.	Ontario Geological Survey, Open File Report 6067*, 101p., 2001
Precambrian Geology, Clyde Forks Area	Easton, R.M.	Ontario Geological Survey, Preliminary Map P.3438, scale 1:50 000, 2001
Precambrian Geology, Barry's Bay Area	Easton, R.M.	Ontario Geological Survey, Preliminary Map P.3444, scale 1:50 000, 2001
Precambrian Geology, Stull Lake Area	Stone, D., Hallé, J. and Pufahl, P.	Ontario Geological Survey, Preliminary Map P.3450, scale 1:50 000, 2001
Precambrian Geology, Papsen Bay Area	Stone, D., Hallé, J. and Pufahl, P.	Ontario Geological Survey, Preliminary Map P.3451, scale 1:50 000, 2001
Precambrian Geology, Mafic Intrusive Rocks of Flett and Angus Townships	Easton, R.M.	Ontario Geological Survey, Preliminary Map P.3452, scale 1:20 000, 2001
Precambrian Geology, Glen Afton (River Valley Area)	Easton, R.M.	Ontario Geological Survey, Preliminary Map P.3453, scale 1:50 000, 2001
Quaternary Geology of the Fort Frances-Rainy River Area	Bajc, A.F.	Ontario Geological Survey, Report 286, 52p., 2001. Accompanied by Maps 2570, 2571 and 2572
Quaternary Geology of the Rainy River Area	Bajc, A.F. and Gray, P.A.	Ontario Geological Survey, Map 2570, scale 1:50 000, 2001
Quaternary Geology of the Emo Area	Bajc, A.F. and White, T.N.	Ontario Geological Survey, Map 2571, scale 1:50 000, 2001
Quaternary Geology of the Northwest Bay Area	Bajc, A.F., White, T.N. and Gray, P.A.	Ontario Geological Survey, Map 2572, scale 1:50 000, 2001
Summary of Field Work and Other Activities 2001	Baker, C.L., Kelly, R.I. and Parker, J.R. (eds.)	Ontario Geological Survey, Open File Report 6070, 402p., 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, Stormy Lake area	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 82 153 - 82 177, scale 1:20 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, apparent conductance and electromagnetic anomalies, Cochrane area	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 82 214 - 82 216, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, apparent conductance and electromagnetic anomalies, Kirkland Lake area	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 82 218 - 82 223, scale 1:50 000, 2001

MINES AND MINERALS INFORMATION CENTRE - 2001

Title	Author	Type and Year of Publication
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, apparent conductance and electromagnetic anomalies, Temagami area	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 82 224, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, apparent conductivity and electromagnetic anomalies, Matheson area	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 82 217, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, total magnetic field, Coral Rapids area--Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 174, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, second vertical derivative of the magnetic field and Keating coefficients, Coral Rapids area--Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 175, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, residual magnetic field, Kapiakau River East area--Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 176 - 60 177, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, second vertical derivative of the magnetic field and Keating coefficients, Kapiakau River East area--Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 178 - 60 179, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, total magnetic field, Kesagami Lake area--Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 180, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, second vertical derivative of the magnetic field and Keating coefficients, Kesagami Lake area--Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 181, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, total magnetic field and electromagnetic anomalies, Melchett Lake area--Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 182, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, second vertical derivative of the magnetic field and Keating coefficients, Melchett Lake area--Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 183, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, total magnetic field and electromagnetic anomalies, Natogami Lake area--Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 185, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, second vertical derivative of the magnetic field and Keating coefficients, Natogami Lake area--Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 186, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, apparent resistivity and electromagnetic anomalies, Natogami Lake area--Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 187, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, total magnetic field and electromagnetic anomalies, Pakwash Lake area--Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 188, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, second vertical derivative of the magnetic field and Keating coefficients, Pakwash Lake area--Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 189, scale 1:50 000, 2001

Title	Author	Type and Year of Publication
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, EM decay constant and electromagnetic anomalies, Pakwash Lake area--Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 190, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, residual magnetic field and electromagnetic anomalies, Troutlake River area--Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 201, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, second vertical derivative of the magnetic field and Keating coefficients, Troutlake River area--Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 202, scale 1:50 000, 2001
Ontario Geological Survey 2001. Airborne magnetic and electromagnetic surveys, EM decay constant and electromagnetic anomalies, Troutlake River area--Purchased data	Operation Treasure Hunt (OTH)	Ontario Geological Survey, Map 60 203, scale 1:50 000, 2001

* Also released in digital form.

† Geochemical data / chemical analyses / appendices available in digital form.

MINES AND MINERALS INFORMATION CENTRE – 2001

Table 5. Geological Survey of Canada publications incorporated into the MMIC Library during 2001.

Title	Author	Type and Year of Publication
Seismic Reflection Profiles and their Contribution to the Development of a Geological Model of the Oak Ridges Moraine area, southern Ontario	Pugin, A., Pullan, S.E. and Sharpe, D.R.	Open File 3561, 1 colour poster, 2001
Mineral-Chemical Database of Regional Greenachist Facies Assemblages in the Central Blake River Group, western Abitibi Subprovince (NTS 32D)	Hannington, M.D., Santaguida, F. and Kjarsgaard, I.M.	Open File D3560, 1 CD-ROM, 2001
Geology, The Hemlo Gold Camp, Ontario	Lin, S.	Map 1975A, scale 1:10 000, 2001. Accompanied by selected levels and sections sheet
A Synthesis of Geological Hazards in Canada	Brooks, G.R. (ed.)	Bulletin 548, 281p., 2001
Weathering the changes: climate change in Ontario	Lavender, B. (ed.)	Miscellaneous Report 73, 1 colour poster, 2001
Geoscape Victoria	Yorath, C., Kung, R. and Franklin, R.	Miscellaneous Report 74, 1 colour poster, 2001
Surficial Geology, Ice Flow Indicators for the New Liskeard-Temagami Area, Ontario	McClenaghan, M.B. and Veillette, J.J.	Open File 3385, 1 large colour sheet, 2001
Focal mechanisms for eastern Canadian earthquakes of 1999	Bent, A.L. and Drysdale, J.	Open File 4085, 107p., 2001
Reconnaissance-scale till survey in the New Liskeard-Temagami region, Ontario: kimberlite indicator minerals and geochemistry	McClenaghan, M.B., Kjarsgaard, I.M. and Kjarsgaard, B.A.	Open File 4086, 98p. + 1 CD-ROM, 2001
Bedrock topography and sediment thickness DEMs of the Greater Toronto and Oak Ridges Moraine areas, southern Ontario	Russell, H.A.J. and Stacey, P. (comp.)	Open File 3699, 1 CD-ROM, 2001
Focal mechanisms for Eastern Canadian earthquakes: 1994-1995	Bent, A.L. and Perry, H.K.C.	Open File 4088, 81p., 2001
The Goldcorp high-grade zone, Red Lake mine, Ontario: a photographic atlas of the main geological features	Dubé, B., Williamson, K. and Malo, M.	Open File 3890, 1 colour poster, 2001
Isostatic residual gravity anomaly map — Canada/Carte des anomalies isostatiques résiduelles du champ de gravité du Canada	Miles, W.F., Roest, W.R. and Vo, M.P.	Open File 4160, 1 colour map, scale 1:7 500 000, 2001

Mines and Minerals Information Centre – 2001

PART TWO

'SUPER FLOW-THROUGH' MAPPING PROJECT

PRELIMINARY FINDINGS

by

W.J. McGuinty

Mines and Minerals Information Centre – ‘Super Flow-Through’ Mapping Project

INTRODUCTION

In 2000, The governments of Ontario and Canada made changes to tax benefits for investors in mineral exploration companies who purchase equity known as flow-through shares. Flow-through shares are sold under special agreement between exploration companies and investors. The company issues these shares and agrees to “flow through” eligible exploration expenses to the investors, who may then report these expenses as deductions to reduce their taxable income. For most of the past decade, flow-through share investors resident in Ontario have received these tax deductions at a rate equivalent to 100% of their investment, provided funds invested were spent on eligible exploration activities in Canada as defined by the Canada Customs and Revenue Agency. In addition to the deduction, the investor receives common shares issued by the company. These have certain restrictions on trading within the year in which they were purchased.

This tax measure is one of several used to develop private sector support for short-term, high-risk investment in sectors where governments feel that investment is required, but where traditional corporate tax measures, such as profit re-investment deductions for companies, cannot be used. This 100% deduction for eligible Canadian Exploration Expenditures (CEE) is similar to incentives offered to private investors in other economic sectors such as culture, technology and research & development.

In recent years, grassroots exploration financing has dropped to very low levels and both industry and government in Ontario have studied how to enhance the flow-through investment tool. Ontario was the first Canadian jurisdiction to improve the tax conditions in support of sustained mineral exploration investment, by including a flow-through enhancement in Ontario's spring 2000 budget. The budget announced a 30% tax deduction for Ontario investors investing in companies carrying out Ontario exploration projects. In late 2000, the governments of Canada and several other provinces reacted as well, announcing enhancements to the flow-through share mechanism. A new 15% federal *Investment Tax Credit for Exploration* and regional incentives in British Columbia, Saskatchewan and Québec were offered. In late 2000, Ontario converted its deduction plan to the five per cent (5%) *Ontario Focused Flow-Through Share Tax Credit* in an effort to harmonize tax provisions and simplify the tax process for the mineral exploration company investor. These new tax credit enhanced shares have been dubbed ‘*Super Flow-Through*’ by the Prospectors and Developers Association of Canada.

For investors in Ontario-based exploration flow-through share financings completed after October 18, 2000, the new Federal tax credit is non-refundable and is available for 3 years, ending in December 2003. The Ontario tax credit is refundable and has no assigned termination date.

RATIONALE FOR STUDY

Ontario has offered several exploration investment incentive programs in the past, notably the Ontario Mineral Exploration Program and the Ontario Mineral Incentive Program. These programs provided direct cash assistance to candidate companies (successful applicants) through the reimbursement of a percentage of the funds they expended on exploration on pre-determined properties. Jointly, these programs invested more than \$103 million from 1981 to 1996 and leveraged private sector investment at a rate of \$6-\$7 per dollar provided through the assistance program. As the Ontario Government administered these programs, tracking of the funds' impacts and benefits was a negotiated part of the investment. The study started with a known finance base and an identified pool of funding recipients.

By contrast, the issuance of flow-through shares is solely the result of an agreement between an investor and an exploration company. The transaction is dependent upon several factors, including investment market conditions, the perception of exploration assets held by the company offering the shares and the tax condition of the potential pool

of investors. The tax benefits obtained from these shares are part of the investor's personal income tax reporting and as such are bound by privacy regulations at both the federal and provincial levels.

The central purpose of the super flow-through mapping project is to create a mechanism for collecting information about this form of financing and to obtain some understanding of the impact that these newly created tax credits have on exploration financing in Ontario. Just as importantly, the study will attempt to show, in a timely manner, how such tax enhancements may improve investment in grassroots exploration across the province.

In Ontario, a number of current and former producers benefited from a previous period of enhanced flow-through share tax incentives offered from 1983 to 1987. The Mineral Exploration Depletion Allowance (MEDA) was a federally administered tax deduction equivalent to 33% of eligible CEE which was added to the base 100% deduction eligible to be "flowed through" to investors. With the exception of several studies in the province of Quebec, which offered additional flow-through tax deduction incentives of its own during this period, information collected on flow-through share financing of exploration for this period was largely anecdotal. Based on media reviews and research by the Prospectors and Developers Association of Canada it can be said that this enhanced flow-through period put previously unobtainable funds toward properties with a minor known occurrence or a small mineral resource and were at least in part responsible for the generation of several mines. In Ontario, these include:

Lac des Iles Mine
Harker Holloway Mine
Glimmer Mine
Lindsley Mine

Eagle River Mine
Magnacon Mine
Edwards Mine

In most of the Ontario examples, development and production occurred *after* federally sponsored MEDA enhancements to flow-through were cancelled. As a result, their economic impacts could not be entered into any cost/benefit assessment when the cancellation of MEDA was considered.

PROPOSED OUTCOMES OF STUDY

The intent of the 'Super Flow-Through' Mapping Project is to create a database that documents all flow-through financings completed and expended in Ontario during the current 3-year period that federal and provincial 'super' tax credit enhancements are at work. The financial information collected will be "geo-referenced" to permit generation of a map showing investment distribution across the province. The spatial component of the database will be generated from current property ownership. Over time, property ownership or mining claim information may change but the geo-referencing will leave the money fixed to the exploration site for future analysis. The outcome will be a series of annual information products that document the following on a selective basis*:

- Number of companies having mineral exploration assets in Ontario;
- Number of companies using the flow-through financing mechanism in the province;
- Number of companies using other financing mechanisms to finance exploration in the province;
- Individual amounts raised pursuant to flow-through financing and other equity financing arrangements;
- Aggregate amounts of flow-through and other equity financing raised; and
- Geographic distribution of mineral exploration projects where flow-through and other equity-derived funds might be targeted.

(*) Criteria for inclusion of a company's financing activities in the flow-through mapping database is described in the section entitled *Flow-through Mapping Project Study Parameters*.

INITIAL LITERATURE AND RESOURCE SURVEY

In order to determine the information resources available for the study, the Industry Liaison Geologist interviewed industry organizations, companies, government and regulatory agencies, primarily to identify any concurrent studies in progress or data gathering mechanisms available to recover flow-through financing information. It was determined that although large amounts of public information might exist, no organization was studying the specific nature of

flow-through financings under the current tax regime. The Prospectors and Developers Association of Canada and Gamah International study mining industry finance at the global scale for all sizes of mining enterprise. Gamah produces a monthly report of mine financing (MECO) and takes specific note of flow-through financings it identifies but does not, as part of its regular reporting, identify the destination of the funds. When interviewed, the Toronto Stock Exchange (TSE) and the Ontario Securities Commission (OSC) were not specifically studying or accumulating flow-through financing information. Both agencies evaluate new share offerings as part of their regulatory operations but the amounts raised via flow-through shares are a very small portion of the volume of the transactions they monitor.

Natural Resources Canada reports annually on exploration levels across the country through information obtained from mining companies in the annual Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures. Data is collected via a general mail out survey and compiled in the last calendar quarter of the year. A follow-up survey in the first quarter of the subsequent year obtains more specific detail about expenditures. The report for year 1999-2000 (forecast) was released in 2001. Although comprehensive in nature, the information gathered is focused on the use of exploration and development funds rather than the means by which the funds were obtained. As such, no information is recorded concerning the amounts of flow-through funds used in supporting exploration activity.

The most comprehensive database of flow-through financing information is also the most unobtainable. The information supplied to the Canada Customs and Revenue Agency (CCRA) by companies issuing flow-through shares forms the basis of all tax deductions to be claimed by flow-through investors. In order to obtain confirmation of all flow-through tax deductions and credits which might be claimed, CCRA requires the submission of Flow-through Share Information forms (T-100) and Statements of Renunciation of Exploration Expense (T-101 Sup.) to be made by flow-through issuing companies. Since all flow-through share issues must report their subscription details, all flow-through deductions and credits exist in this central database. However, because this information is intrinsically tied to individual taxpayers' tax filings the information cannot be released by tax/revenue agencies in its raw form.

Since distilled information was found not to be useful for the development of the base for the study, it was determined that the study should base itself on a sampling of public news releases by exploration companies. An initial review of published exploration and financing information concluded that the Internet-based System for Electronic Document Analysis and Retrieval (SEDAR) would provide the most consistent information source for data collection about flow-through financing. SEDAR is a public information website that allows users to gain access to most Canadian public company and mutual fund information in the public domain.

An initial review was conducted in May 2000 of all SEDAR posted press releases from the date of the announcement of the federal Exploration Investment Tax Credit on October 18, 2000, to April 30, 2001. The survey focused on 3 subdivisions of SEDAR: Gold and Precious Metals; Junior Natural Resources -- Mining; and Metals and Minerals -- All. A total of 5380 news releases were issued through these 3 SEDAR divisions during the period. These releases were reviewed to determine A) the nature of the company's activity, B) principal area of exploration activity, and C) announced financing of exploration via flow-through shares.

Approximately 1100 companies issued information about their corporate activities during this period with approximately 10% indicating some part of their activity was related to exploration in Ontario. Approximately 5% of these companies reported some intention to finance or reported completing a financing. The Industry Liaison Geologist concluded that SEDAR would provide a representative sampling of exploration and financing information for Ontario on which to base the flow-through tracking study.

FLOW-THROUGH MAPPING PROJECT - STUDY PARAMETERS

The flow-through mapping project has been divided into 2 phases as dictated by the flow of information and the use of the resulting data. The Data Acquisition Phase has reached its first milestone at the end of the first full calendar year of exploration and financing activity since the announcement of the harmonized federal and provincial tax credit programs in late 2000. Data has been compiled from SEDAR press releases for the period starting October 18th,

2000 and ending January 15th 2002. The data acquired will form the basis of financial observations for the period and the base data for the mapping phase. Data acquisition is ongoing and January 15th, 2002 has been selected as a cut-off date for data to be included in the observations as they apply to this report. This date allows for announcements of closing of share offerings at the end of 2001 to be processed through SEDAR.

The Flow-Through Mapping Phase will begin in early 2002, once the finance information collected during the October, 2000 to January, 2002 period has been consolidated. The generated map will locate mineral properties within Ontario that are being explored by companies who have raised flow-through capital during the period. The Mapping Phase is also an ongoing project and will use the same cut-off date of January 15th, 2002 for interim reporting purposes. No map has been prepared for this report.

DATA ACQUISITION PHASE

During the initial SEDAR study, an Active SEDAR Companies Table was created for publicly traded companies, identifying each by name, SEDAR sub-listing and principal business focus. In the case of companies involved in mineral exploration, principal business focus was defined by the stated jurisdiction in which the company was undertaking mineral exploration. Companies were divided into exploration categories by Canadian province, United States and Offshore. Companies that are no longer in the exploration business were identified by their business directions. Categories were established for companies involved in a Change of Business, Oil exploration or as being Delisted from an exchange. A category was also developed for companies that can be classified as Not an Issuer. These companies have stated production and/or possible income from operations that would likely encumber the issuing of flow-through shares. Corporations with cash flow from operations are more likely to use their exploration deductions to offset income and are therefore less likely to be able to transfer that advantage to a shareholder. Companies who are producers can issue flow-through shares. Goldcorp and River Gold Mines are 2 examples where producers are financing exploration with this vehicle. Non flow-through equity financings from companies who are identified as Not an Issuer are not being tabulated in this study.

One last category, Undefined, has been established for companies which have issued corporate information but have not stated any business direction within the current period of Data Acquisition.

During the course of the initial SEDAR study, an Ontario bias has been installed in the Active SEDAR Companies Table to reflect any company reporting to SEDAR that may have an Ontario property. Even if the principal exploration focus of the company is not in Ontario, some money may yet be invested. The company can then be included in the data gathering about Ontario exploration expenditures during the Mapping Phase. These data are gathered in part from press releases and in part from intelligence obtained from staff of the Ontario Geological Survey Resident Geologist Program (RGP) who monitor and assist mineral exploration activities throughout the province. The companies identified by the RGP have been incorporated in the Active SEDAR Companies Table.

SEDAR posted press releases are reviewed on a bi-weekly basis. Press releases for companies appearing on SEDAR which have been identified as Ontario explorers are all reviewed for Ontario related exploration and financing activity. Press releases for companies new to the Active SEDAR Companies Table are also reviewed, classified and incorporated into the working table. All press releases made by companies classified as Undefined are also reviewed and if sufficient information is obtained, the companies are re-classified to another category. All Adobe Acrobat format press releases found to be reporting Ontario activity are downloaded and saved electronically.

For the period ending January 15th, 2002, the working table of companies for the data acquisition phase contains the following summary information:

- 1293 companies listed on SEDAR mining subdivisions have reported corporate activities through a press release;
- 828 companies (64%) state they continue to be involved in exploration as junior exploration companies;
- 500 junior exploration companies state that they are working in Canada (60% of exploration companies); and
- 202 companies have stated they have exploration assets in Ontario (40% of Canada). These companies have reported exploration, or acquisition, of over 300 Ontario mineral properties as a principal or joint venture owner

during the period.

Chart 2-1 illustrates the distribution of those companies reporting via press release to SEDAR under this service's mining categories during the period from October 18, 2000 to January 15, 2002. Chart 2-2 focuses on the distribution of exploration activities by those companies still citing exploration as their business focus. As previously mentioned, a bias has been established towards identifying companies exploring in Ontario to the exclusion of activities they might pursue elsewhere. This bias alone does not cause the high weighting of activity in Ontario as depicted in the chart. More companies report working in Ontario as a principal focus for exploration than elsewhere.

FINANCIAL DATA COLLECTION METHOD

All news relating to flow-through financings by Ontario-identified companies is tabulated, along with any regular non flow-through share issuance for new capital. Closing dates are recorded from subsequent press releases. Exceptions to this procedure occur when the use of non flow-through funds has a stated destination outside of Canada. In these cases, the company cannot blend flow-through capital into the project's financing and it is assumed the company has to dedicate these "hard dollars" offshore. Financial data is also not recorded when the financing is announced as "shares for debt". Identifying the use of share for debt capital is not explicit in financial reporting and is not likely to be applied to exploration expenses incurred within the 2001 - 2003 incentive period until subsequent years. Share for debt funding of 2001 exploration costs may occur in 2002 or 2003, and a method of properly identifying these funds will need to be determined.

Individual financing information tabulated during the past year includes:

Issuing Company	Date Announced	Date Closed
# of Units	Description of units	Description of Warrant
Gross Amount	Flow-through Amount	

Table 2-1 lists all companies who announced share offerings as either flow-through or "hard dollar" equity financings during the first Data Acquisition period. All but 2 were successful in closing at least one financing. Table 2-2 summarizes the financing data recovered from the SEDAR review for the same Data Acquisition period.

VERIFICATION OF FINANCING INFORMATION

In January 2002, SEDAR filings of quarterly and annual financial statements by companies identified as flow-through and regular equity issuers were reviewed for the Data Acquisition period. This was done as a means of verifying financial information from press releases. Adjustments were made to the financial data to match quarterly statements where possible, including cancellations of, and amendments to, published financings as well as unpublished financings.

LIMITATIONS ON THE INFORMATION GATHERED

Accuracy of Financial Reporting

Flow-through (FT) and combined FT + equity financing details may not be clear in the press release information as the conditions establishing the proportions of the FT component or definition of the type of warrant to be used may depend on the as yet undetermined need of the purchaser. Floating percentages in the press releases with no subsequent confirmation of proportions were frequently found, as well as a lack of precision concerning the common or FT nature of warrants.

Definition of a Material Change

Interpretation of the significance of disclosing a financing varies by issuer. Some may interpret a small financing as not material enough to the company's shareholders to be worth issuing a press release. In some cases, these

financings are captured by review of quarterly financial statements. Other companies do not issue press releases but file reports of financings as Statements of Material Change on the SEDAR website. These cannot be sorted independently by the system and are difficult to compile.

Uniformity of Press Releases

In some cases press releases are not issued to confirm the closing details of a financing or of the exercise of warrants, both of which may potentially cause inaccuracies in the data collected.

Amounts Directed to Exploration in Ontario

Final distribution of FT and common share capital is eventually assigned by the financial officers of the company rather than the explorers. Determining if FT, or hard dollars, or parts of both will go to a given geographic area will depend on the company fulfilling the tax benefits promised to the investors. Hard dollar money may come to an Ontario property because all of the company's FT investors are Vancouver-based and want the benefits of BC tax credits which would arise from applying FT to work done on the company's BC properties.

Unobserved Financings

A few press releases within the more than 10 000 released annually on the 3 targeted SEDAR listings will inadvertently be missed by the reviewer. In addition, the Ontario bias built in to the review method allows a change of exploration focus to Ontario from a company previously observed working in another jurisdiction or vice versa. The reviewer relies on colleagues in the OGS Resident Geologist Program to identify new Ontario players as well as general media information sources such as the Northern Miner.

SUMMARY FINDINGS

Data compilation on financing and exploration was completed at the end of January 2002, for the Data Acquisition Period from October 18th, 2000 to January 15th, 2002. Extended information analysis will be undertaken during the Mapping Phase. During this period advice and comment will be sought from mining sector organizations and government agencies with special interest in Flow-through financing. This will be done to verify that the data collected continues to be relevant and accurately recorded and to ascertain that the data are inclusive enough for the purposes of the study.

In total, \$108 924 540 in equity financing was raised by Identified Companies exploring in Ontario for the Data Acquisition Period. A total of \$69 336 195 was raised through flow-through share sales and common share sales financing amounted to \$39 588 345. At the end of the period, the closing of \$17 945 939 in total financings was unconfirmed. The total amount of approximately \$109 million falls short of the estimated exploration funds required to sustain mineral deposit discovery as proposed last year by the Prospectors and Developers Association of Canada. The Association suggests in media communications that a threshold of \$350 million in exploration is needed in Canada. On a pro-rata basis with 40% of the exploration companies indicating activity in Ontario, the provincial amount should be approximately \$140 million.

Of the 202 companies identifying mineral assets in the province of Ontario in the Data Acquisition Period, only 99 (49%) were found to have announced a financing through SEDAR. This would indicate about half of the companies that could be exploring in Ontario are without funds or spending cash reserves. These 99 companies announced 254 financings.

Of the 79 companies that raised \$69.4 million in flow-through capital during the Data Acquisition Period, 5 companies account for \$26.9 million, or almost 39%, of total flow-through raised. Two of the 5 are producers. Amounts raised by the 74 other companies are quite variable, ranging from \$15 000 to \$2 000 000. The range in secured amounts indicates that many resulting exploration projects would be quite small.

Twenty companies raised funds through sale of common shares only in the amount of \$3.96 million. Over twice as many companies raised 9 times that amount in value of shares sold (\$35.62 million) by combining common shares and flow-through shares in a single offering or selling common and flow-through in separate but closely timed offerings. The pool of companies may be too small to draw direct conclusions about this anomalous information. It may be useful to obtain information from companies raising only hard dollars about whether there are impediments to using a flow-through offering or if this is a choice by the company or if it is driven by investors. Further review of this particular difference in financing levels is required.

Eighteen of 79 flow-through issuers attached flow-through warrants to their share offerings. If exercised, these shares will generate an additional \$13.7 million, or 20% of the value of the announced financings during the Data Acquisition Period. Exercising these warrants may not be reported in a press release because of the small amounts exercised at any given time. The flow-through warrant may be a very useful tool to an investor purchasing shares for tax credit purposes as they can be exercised at a time convenient to the purchaser and to the specific amount required for tax purposes. For the issuer, the added tax appeal of the flow-through warrant may improve the odds of the warrants being exercised and reduce future financing costs.

The majority of the press releases about flow-through share financings appear to state that they have been undertaken as private placements between individual purchasers and the issuer. This would indicate that mutual fund-managed investments in super flow-through are not being made as frequently as hoped, except perhaps where the fund has not declared itself. It also indicates the possibility that the new tax incentives have not caused the expected interest in flow-through shares to take hold beyond traditional investors into the general investing public.

Chart 2-1. Distribution of reporting public companies on SEDAR mining listings.

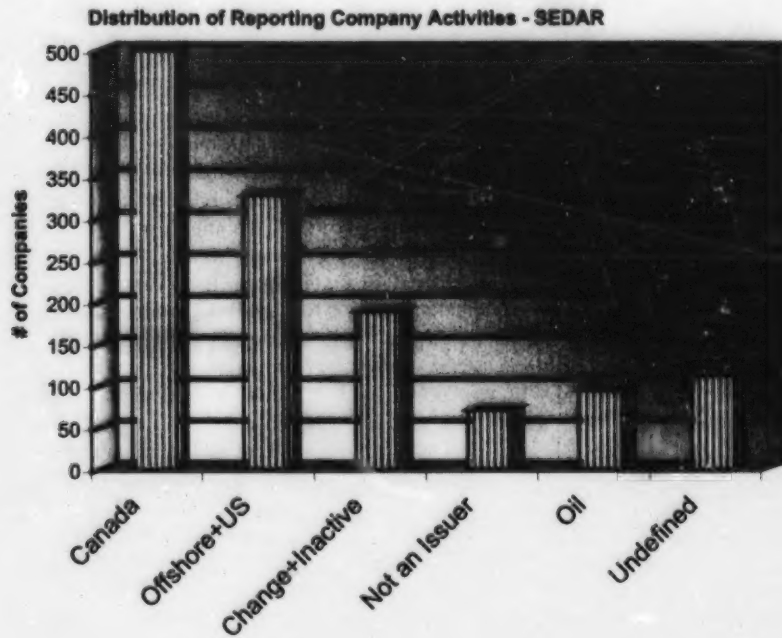
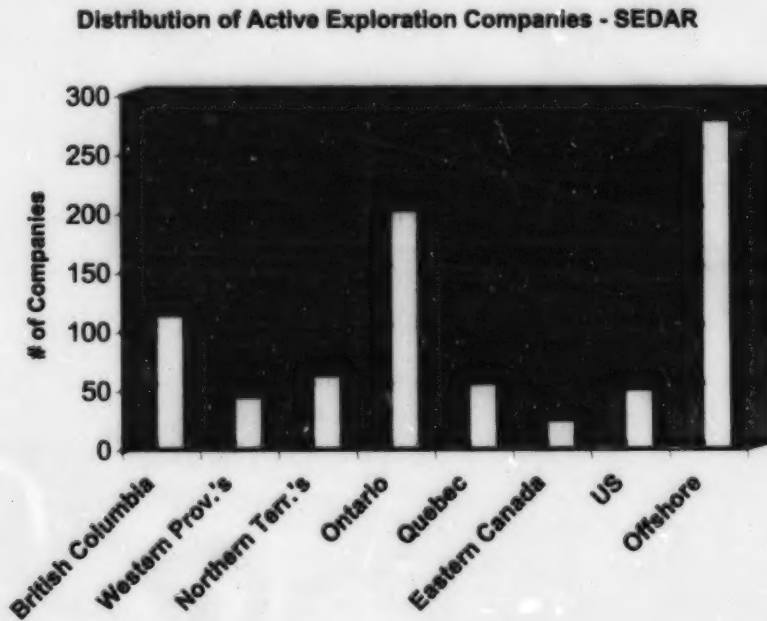


Chart 2-2. Distribution by geographic region of exploration company activity.



MINES AND MINERALS INFORMATION CENTRE – 2001

Table 2-1. Identified companies with Ontario properties having announced financings in 2001.

Aquiline Resources Inc.	Kalahari Resources Inc.
Ashton Mining Inc.	Kinbauri Gold Corp.
Atikokan Resources Inc.	KRL Resources Corp.
Aurogin Resources Ltd.	KWG Resources Inc.
Aurora Platinum Corp.	L.E.H. Ventures Ltd.
Avalon Ventures Ltd.	Liberty Mineral Exploration Inc.
Band-Ore Resources Ltd.	Linear Resources Ltd.
Berland Resources Ltd.	Lydia Diamond Exploration of Canada Ltd.
Boulder Mining Corporation	Macdonald Mines Exploration Ltd.
Broadlands Resources Ltd.	MCK Mining Corp.
Buck Lake Ventures Ltd.	Mustang Minerals Corp.
Cabo Mining Corp.	Navigator Exploration Corp.
Canabrava Diamond Corporation	New Millenium Minerals Ltd.
Canadian Arrow Mines Limited	North American Gem Inc.
Canadian Golden Dragon Resources Ltd.	North Atlantic Nickel Corp.
Canaleska Ventures Ltd.	Northway Explorations Limited
Candor Ventures Corp.	Novawest Resources Inc.
Canplats Resources Corp.	Nuinsco Resources Limited
Champion Bear Resources Ltd.	Ontex Resources Limited
Classic Gold Resources Limited	Opawica Explorations inc.
Claude Resources Inc.	Orezone Resources Inc.
Consolidated Venturex	Pacific North West Capital Corp.
Cross Lake Minerals Ltd.	Pacific Topaz Resources Ltd.
Cypress Development Corp.	Pan American Resources Inc.
Denstone Ventures Ltd.	Patricia Mining Corp.
Diadem Resources Ltd.	Pelangio Mines Inc.
East West Resource Corporation	Pele Mountain Resources Inc.
Emerald Isle Resources Inc.	PGM Ventures Corporation
Explorers Alliance Corp.	Pifher Resources Inc.
First Point Minerals Corp.	Platinova A/S
Flag Resources Limited	Polymet Mining Corp.
Fort Knox Resources Inc.	Quaterra Resources Inc.
Foxpoint Resources Ltd.	River Gold Mines Ltd.
Freewest Resources Canada Inc.	RJK Explorations Ltd.
Geomaque Explorations Ltd.	Rubicon Minerals Corporation
Glenhaven Ventures Inc.	Skye Resources Inc.
Globex Mining Enterprises Inc.	Slam Exploration Ltd.
Goldcorp Inc.	Spider Resources Inc.
Golden Hat Resources Inc.	Sruce Ridge Resources Ltd.
Golden Tag Resources Inc.	Starcore Resources Ltd
Goldeye Explorations Inc.	Sudbury Contact Mines Limited
Goldhunter Explorations Inc.	Talus Ventures corp.
Greater Lenora Resources Corp.	Temex Resources Corp.
Holmer Gold Mines Limited	Tres-Or Resources Ltd.
Houston Lake Mining Inc.	Tri Origin Exploration Ltd.
Hucamp Mines Limited	United Tex-Sol Mines Inc.
International Kirkland Minerals Ltd	Upland Resources Corporation
Intrepid Minerals Corporation	Western Prospector Group Ltd.
JML Resources Ltd.	Wolfden Resources Inc.
Jonpol Explorations Limited	

MINES AND MINERALS INFORMATION CENTRE – 2001

Table 2-2. - Flow-through financing study - summary of observations.

<u>Company Information</u>			
Number of Identified Companies with exploration projects in Ontario through press releases during the Data Acquisition Period	202		
Number of Identified Companies with announced financings	99		
Number of financings completed by date of review	187		
Number of financings not completed by date of review	46		
Number of financings cancelled by date of review*	12		
Total financing by Identified Companies in review period**			\$108,924,540
Total flow-through share financing amount			\$ 69,336,195
Total common share financing amount			\$ 39,588,345
Number of financings announced by Identified Companies	254		\$108,924,540
Number of Identified Company financings with flow-through shares only	118		\$ 54,705,479
Number of Identified Company financings with common shares only	91		\$ 28,596,037
Number of Identified Company financings with a combination of flow-through and Common shares	45	{FT {Com	\$ 14,630,716 \$ 10,992,307
Additional value of flow-through shares contained in flow-through warrants, FT only†			[\$12,030,356]
Additional value of flow-through shares contained in flow-through warrants, FT + Com.†			[\$ 1,743,655]

* Only 2 companies of the identified companies (3 cancelled financings) did not succeed during the period.

** Data acquisition period - October 18th, 2000 to January 15th, 2002.

† Exercise of warrants is dependent upon share price during the period the warrant is offered. Amounts are included for flow-through warrants as they constitute a new flow-through share offering if exercised and will be eligible for super flow-through credits. The amounts stated do not represent amount currently raised by offering companies.





**Ontario Geological Survey
Regional Resident Geologist Program**

Petroleum Resources Centre—2001

by

T.R. Carter and B.D. Parkes

2002

CONTENTS

Petroleum Resources Centre–2001

Introduction.....	1
North American Markets.....	1
Natural Gas	1
Crude Oil	1
Exploration Activity.....	2
Ordovician Targets	2
Cambrian Targets.....	3
Silurian Reef Targets	3
Silurian Sandstone Targets	3
Devonian Targets.....	3
Recommendations for Exploration.....	4

Tables

1. Successful exploratory wells in southwestern Ontario, 2001	4
---	---

Figures

1. Successful exploratory wells in Ontario, 2001	5
--	---

Petroleum Resources Centre–2001

Oil and Gas Exploration and Development Activity in Ontario in 2001

T.R. Carter¹ and B.D. Parkes²

¹Subsurface Geologist, Petroleum Resources Centre, Ministry of Natural Resources, London

²Manager, Oil, Gas and Salt Resources Library

INTRODUCTION

During 2001, oil and gas drilling activity continued at the strong levels established in 2000, spurred on by record natural gas prices and higher than average oil prices early in the year and record production revenues for the previous year. Prices moderated considerably late in the year, due to high natural gas storage levels in North America and a very mild winter in 2001-2002. In 2000 Ontario producers received \$65.6 million for crude oil shipments and an estimated \$102 million for natural gas produced in the province, compared to \$44 million and \$60 million, respectively, in 1999. The value of the 2001 production is not yet available.

NORTH AMERICAN MARKETS

Natural Gas¹

Natural gas prices soared in January 2001 due to low natural gas storage inventories, high world crude oil prices, high demand for gas power generation, lower rates of drilling for new reserves than in previous years and a much colder winter over 2000-2001. January 2001 saw natural gas commodity prices peak at Cdn \$13.78/Gigajoule (GJ) (AECO storage hub), an increase of 63% from December 2000. Due to a recession in the U.S. and world economies and the events of September 11, commodity prices spiralled downward during the year, with a December average of Cdn \$3.39/GJ. Despite the downward trend of natural gas prices, the average price in 2001 increased to Cdn \$5.91/GJ from Cdn \$4.81/GJ in 2000, an increase of 23%.

Crude Oil^{2,3}

Crude oil prices averaged around US \$26 per barrel during 2001 (WTI NYMEX), down from an average of US \$30 per barrel in 2000. Crude prices dropped as low as US \$18 per barrel in early December 2001. Demand for petroleum products and crude oil declined in 2001 as the world economy slid into recession. The overall decline in demand put downward pressure on crude oil prices. The downturn in commercial air travel, created by September 11 events, depressed prices even further. OPEC made several production cuts throughout the year to alleviate the low prices.

As with natural gas, crude oil prices were elevated in the first quarter of 2001 due to cold winter temperatures in North America. A warmer than average summer, extending into a warmer than average winter, resulted in very little upward pressure on crude oil prices at year-end 2001. Canadian pricing was further depressed by a sliding Canadian dollar. Crude oil prices in Ontario were slightly higher than in Alberta as summarized in the following table.

¹ Natural Resources Canada, Natural Gas Market Update (www.nrcan.gc.ca)

² Natural Resources Canada, Oil Division (www.nrcan.gc.ca)

³ Fuel Facts Price Monitoring, Ontario Edition, vol.2, issue 24, Dec. 18, 2001 (www.mjervin.com)

Selected Crude Oil Prices (bbl = barrel)

(from Natural Resources Canada, Oil Division)

Month	Cdn Par Edmonton \$Cdn/bbl	Brent Sarnia \$Cdn/bbl
2001-01	\$43.60	\$43.49
2001-02	\$44.32	\$47.05
2001-03	\$41.03	\$43.62
2001-04	\$41.62	\$45.37
2001-05	\$42.79	\$48.98
2001-06	\$42.21	\$47.44
2001-07	\$40.56	\$43.22
2001-08	\$41.36	\$44.94
2001-09	\$39.56	\$44.69
2001-10	\$33.87	\$37.52
2001-11	\$30.18	\$35.58
2001-12	\$29.37	\$34.51

EXPLORATION ACTIVITY

Oil and gas drilling activity in Ontario during 2001 remained at high levels as commodity prices for natural gas and crude oil fuelled exploration and development activity. A total of 142 licences to drill and operate new wells were issued by the Ministry of Natural Resources in 2001, compared to 118 in 2000. At the time of writing, drilling was reported to be complete at 112 wells consisting of 34 exploratory wells, 76 development wells, and 2 service wells. Horizontal drilling accounted for 36 of the 112 wells drilled in 2001, continuing the increasing popularity of this technology. The 2001 exploratory drilling resulted in 14 wells reported as gas producers and 3 wells reported as oil producers (Table 1, Figure 1). Development drilling was very successful with 19 wells reported to be oil producers and 46 as gas producers. Most of the successful oil wells were completed in Ordovician targets, while completions in Silurian sandstone reservoirs dominated the gas-producing wells.

Talisman Energy Inc. was the most active exploration company in Ontario's petroleum industry in 2001, with 35 wells drilled. As in previous years Talisman focussed its efforts on the Ordovician oil play and on natural gas pools in Silurian sandstone and reef targets beneath the waters of Lake Erie. Greentree Gas & Oil Ltd. finished the year in second place with 20 wells drilled, all in Silurian sandstone in Norfolk County.

Ordovician Targets

Drilling was conducted on 9 exploratory wells and 20 development wells that tested targets in Ordovician stratigraphy in 2001. Three of the exploratory wells are reported to be potential oil producers and demonstrate the continuing dominance of Ordovician stratigraphy as the premier oil play in Ontario. Two of these three wells were horizontal wells drilled from onshore locations beneath the waters of Lake Erie. TLM No.1 (Horiz.#1) Romney 8-194-TRS represents a new pool discovery. TLM No.2 (Horiz.#1) Romney 5-203-I also was completed as an oil producer in what may be a new pool discovery or an offshore extension of the Romney 5-15-I oil pool. TLM No.1 (Horiz.#1) Tilbury West 3-2-X was completed as a new oil pool discovery on a strike extension of the fault structure that hosts the prolific Rochester oil pools.

The Ordovician development drilling resulted in 15 new oil producers and 1 gas producer, with 2 wells still under evaluation. Successful oil wells were completed in the Hillman, Mersea 1-16-I, Mersea 5-20-A, Mersea 3-6-V (Wigle), Gosfield North 2-21-VI, Mersea 3-4-IV, Romney 3-8-II and Romney 5-15-I pools. Talisman Energy Inc. drilled all of these wells. One gas well was completed in the Blenheim 8-13-IX pool by Shiningbank Energy Ltd.

Cambrian Targets

Eight wells were drilled to test targets in Cambrian stratigraphy in 2001; six as exploratory wells and 2 as development wells. Two development wells and 3 exploratory wells were drilled by Shiningbank to test for extensions to the Innerkip gas pool. All 5 wells were completed as gas producers. Talisman Energy drilled 3 deep test wells in eastern Lake Erie in 2001 to test Ordovician and Cambrian strata. Two of these wells reached the target formations but did not encounter commercial quantities of hydrocarbons. Drilling of the third well has been suspended prior to reaching the target formation. Drilling is planned to resume in 2002.

Silurian Reef Targets

There were 7 exploratory wells completed on Silurian Guelph-Salina reef targets in 2001. Range-St. Clair et al No. 1 Enniskillen 4-18-III was reported to have encountered oil and natural gas and is undergoing further evaluation. If completed for production this would be a new pool discovery. The remaining wells were all plugged and abandoned.

There were 19 development wells completed on Silurian Guelph-Salina reefs in 2001. Ten wells were drilled offshore in Lake Erie by Talisman Energy Inc. to develop natural gas reservoirs in the Morpeth and Silver Creek platform reefs. All of the wells were either completed for production or reported as potential gas producers. In onshore activity Clearwood Resources Inc. drilled 2 development wells on pinnacle reefs in Huron County, completing one gas well in the Hay 5-12-XV gas pool and reporting the other as a potential gas producer in the Dashwood pool. The Consumers' Gas Company completed 3 wells as oil producers in the Corunna and Seckerton North pools and Range Petroleum Corp completed an oil well in the Courtright reef complex.

Silurian Sandstone Targets

There was a major rejuvenation of interest in Silurian sandstone targets in 2001, as high natural gas prices improved the economics of this low volume, gas-dominated play. A total of 11 exploratory and 34 development wells tested Lower Silurian sandstone targets in 2001. All 11 exploratory wells were reported to be gas producers or potential gas producers. Six of these wells were drilled by Echo Energy Inc in exploratory delineation of the boundary of the new Bayham 4-16-I gas pool. GGOL #40 Houghton 8-20-I and GGOL #37 Houghton 3-15-II were drilled by Greentree Gas & Oil as exploratory extensions of the Houghton 7-17-II gas pool. GGOL #41 Middleton 4-10-II STR is a new pool discovered near the pinch-out edge of the Thorold and Grimsby sandstones in Middleton Township. Metalore 90 North Walsingham 1-21-VII is a successful exploratory extension of the extensive Norfolk gas field. Visser #1 Wainfleet 3-11-V was a successful private well drilled as an exploratory extension of the Welland gas field.

Twenty-five development wells were reported as gas producers or potential gas producers. Successful wells were drilled in 5 different pools that include South Walsingham 5-6-VI, Bayham 4-16-I, Lincoln, Houghton 8-2-VIII and Houghton 2-13-I. Greentree Gas & Oil was the most active company in the play, accounting for 13 of the new gas wells. Successful wells were also completed by Founder Resources, Metalore Resources, NRG Corp and Echo Energy Inc. Five other wells were completed as private gas wells in parts of the Welland and Haldimand gas fields. Four wells were plugged and abandoned with no production.

Devonian Targets

Only 1 exploratory well and 1 development well were drilled to test targets in Devonian stratigraphy in 2001. Both wells were abandoned. Two wells for disposal of oil field fluids were completed in Devonian strata in 2001.

Preliminary figures for production of oil and natural gas are not yet available.

RECOMMENDATIONS FOR EXPLORATION

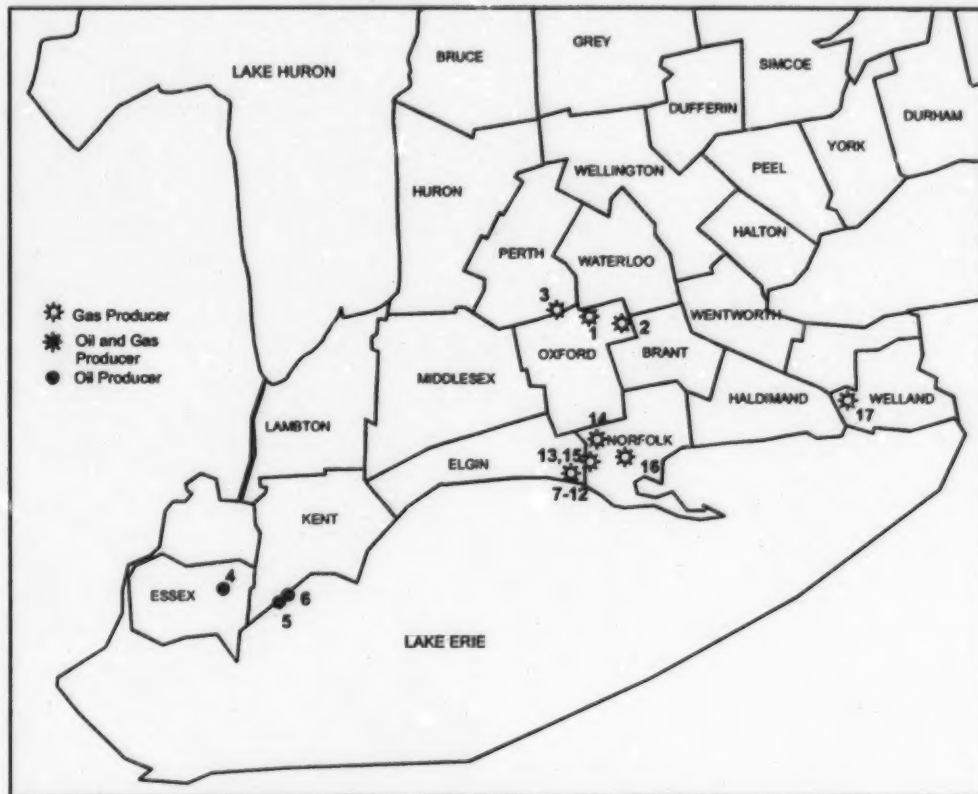
Ordovician reservoirs are still the focus of exploration directed at discovery of new oil reservoirs. Reservoirs located in near-shore locations on Crown land beneath Lake Erie have become very attractive targets in the past 2 years. Essex County and southern Kent County are still the most attractive onshore locations. Most of the wells drilled in this target area utilize horizontal drilling technology.

There still remains considerable untested natural gas potential in Lake Erie and parts of the onshore portions of Haldimand, Norfolk, and Welland counties. Should natural gas prices remain high the economic viability of all the gas plays in Ontario are greatly enhanced, in particular target areas within the Lower Silurian sandstone, both onshore and offshore, and the platform reef play offshore in Lake Erie. There is potential for discovery of Cambrian stratigraphic gas or oil pools along the pinch-out edge of the Cambrian sandstone in the subsurface, or in fault-controlled structures. Silurian pinnacle and incipient reefs in Lambton County are also gas-prone and have the additional advantage of potential conversion to natural gas storage.

Table 1. Successful exploratory wells in southwestern Ontario, 2001. (See Figure 1 for well locations.) Abbreviations: CAM = Cambrian; ORD = Ordovician; CLI = Silurian sandstone; GP = gas producer; OP = oil producer; PGP = private gas producer; ACT = active; CAP = capped; POT = potential producer.

Map #	Latitude	Longitude	Well Name	Target	Depth (m)	Results	TD Date
1	43-17-46.8	80-41-8.5	Shiningbank/JEL #88 Blandford 5-3-XIII	CAM	885	GP-ACT	2001/01/23
2	43-12-54.14	80-32-30.11	Shiningbank/JEL #89 Blenheim 7-12-V	CAM	862	GP-ACT	2001/08/27
3	43-19-44.93	80-50-47.59	Shiningbank/JEL #82 South Easthope 1-22-V	CAM	917	GP-CAP	2001/02/04
4	42-11-23.05	82-35-25.64	TLM No.1 (Horiz.#1) Tilbury West 3-2-X	ORD	2050	OP-POT	2001/10/18
5	42-07-52.11	82-22-36.18	Talisman No.2 (Horiz.#1) Romney 5-203-I	ORD	3298	OP-ACT	2001/04/13
6	42-8-49.03	82-20-03.83	TLM No.1 (Horiz.#1) Romney 8-194-TRS	ORD	2214	OP-ACT	2001/09/30
7	42-39-05	80-45-25	Echo 4 Bayham 7-21-II	CLI	432	GP-CAP	2001/07/25
8	42-38-45	80-46-55	Echo 5 Bayham 4-16-I	CLI	430	GP-CAP	2001/05/23
9	42-38-30	80-45-50	Echo 6 Bayham 4-20-I	CLI	438	GP-CAP	2001/06/20
10	42-37-59.94	80-44-06	Echo 7 Bayham 4-26-I	CLI	425	GP-POT	2001/11/13
11	42-38-8.36	80-44-37.38	Echo 8 Bayham 3-24-I	CLI	445	GP-CAP	2001/10/10
12	42-38-43.62	80-44-37.32	Echo 9 Bayham 8-24-II	CLI	430	GP-CAP	2001/10/10
13	42-41-47.30	80-39-45.48	GGOL #37 Houghton 3-15-II	CLI	393	GP-ACT	2001/04/03
14	42-46-19.54	80-38-56.51	GGOL #41 Middleton 4-10-II STR	CLI	425	GP-ACT	2001/09/21
15	42-44-0.616	80-41-07.17	GGOL #40 Houghton 8-20-I	CLI	411	GP-POT	2001/05/15
16	42-43-10.02	80-29-02.94	Metalore No.90 North Walsingham 1-21-VII	CLI	427	GP-ACT	2001/11/16
17	42-57-30	79-20-10	Visser #1 Wainfleet 3-11-V	CLI	197	PGP-ACT	2001/02/15

Figure 1. Successful exploratory wells in Ontario, 2001.



Metric Conversion Table

Conversion from SI to Imperial			Conversion from Imperial to SI		
SI Unit	Multiplied by	Gives	Imperial Unit	Multiplied by	Gives
LENGTH					
1 mm	0.039 37	inches	1 inch	25.4	mm
1 cm	0.393 70	inches	1 inch	2.54	cm
1 m	3.280 84	feet	1 foot	0.304 8	m
1 m	0.049 709	chains	1 chain	20.116 8	m
1 km	0.621 371	miles (statute)	1 mile (statute)	1.609 344	km
AREA					
1 cm ²	0.155 0	square inches	1 square inch	6.451 6	cm ²
1 m ²	10.763 9	square feet	1 square foot	0.092 903 04	m ²
1 km ²	0.386 10	square miles	1 square mile	2.589 988	km ²
1 ha	2.471 054	acres	1 acre	0.404 685 6	ha
VOLUME					
1 cm ³	0.061 023	cubic inches	1 cubic inch	16.387 064	cm ³
1 m ³	35.314 7	cubic feet	1 cubic foot	0.028 316 85	m ³
1 m ³	1.307 951	cubic yards	1 cubic yard	0.764 554 86	m ³
CAPACITY					
1 L	1.759 755	pints	1 pint	0.568 261	L
1 L	0.879 877	quarts	1 quart	1.136 522	L
1 L	0.219 969	gallons	1 gallon	4.546 090	L
MASS					
1 g	0.035 273 962	ounces (avdp)	1 ounce (avdp)	28.349 523	g
1 g	0.032 150 747	ounces (troy)	1 ounce (troy)	31.103 476 8	g
1 kg	2.204 622 6	pounds (avdp)	1 pound (avdp)	0.453 592 37	kg
1 kg	0.001 102 3	tons (short)	1 ton (short)	907.184 74	kg
1 t	1.102 311 3	tons (short)	1 ton (short)	0.907 184 74	t
1 kg	0.000 984 21	tons (long)	1 ton (long)	1016.046 908 8	kg
1 t	0.984 206 5	tons (long)	1 ton (long)	1.016 046 90	t
CONCENTRATION					
1 g/t	0.029 166 6	ounce (troy)/ ton (short)	1 ounce (troy)/ ton (short)	34.285 714 2	g/t
1 g/t	0.583 333 33	pennyweights/ ton (short)	1 pennyweight/ ton (short)	1.714 285 7	g/t

OTHER USEFUL CONVERSION FACTORS

	Multiplied by	
1 ounce (troy) per ton (short)	31.103 477	grams per ton (short)
1 gram per ton (short)	0.032 151	ounces (troy) per ton (short)
1 ounce (troy) per ton (short)	20.0	pennyweights per ton (short)
1 pennyweight per ton (short)	0.05	ounces (troy) per ton (short)

Note: Conversion factors which are in bold type are exact. The conversion factors have been taken from or have been derived from factors given in the Metric Practice Guide for the Canadian Mining and Metallurgical Industries, published by the Mining Association of Canada in co-operation with the Coal Association of Canada.